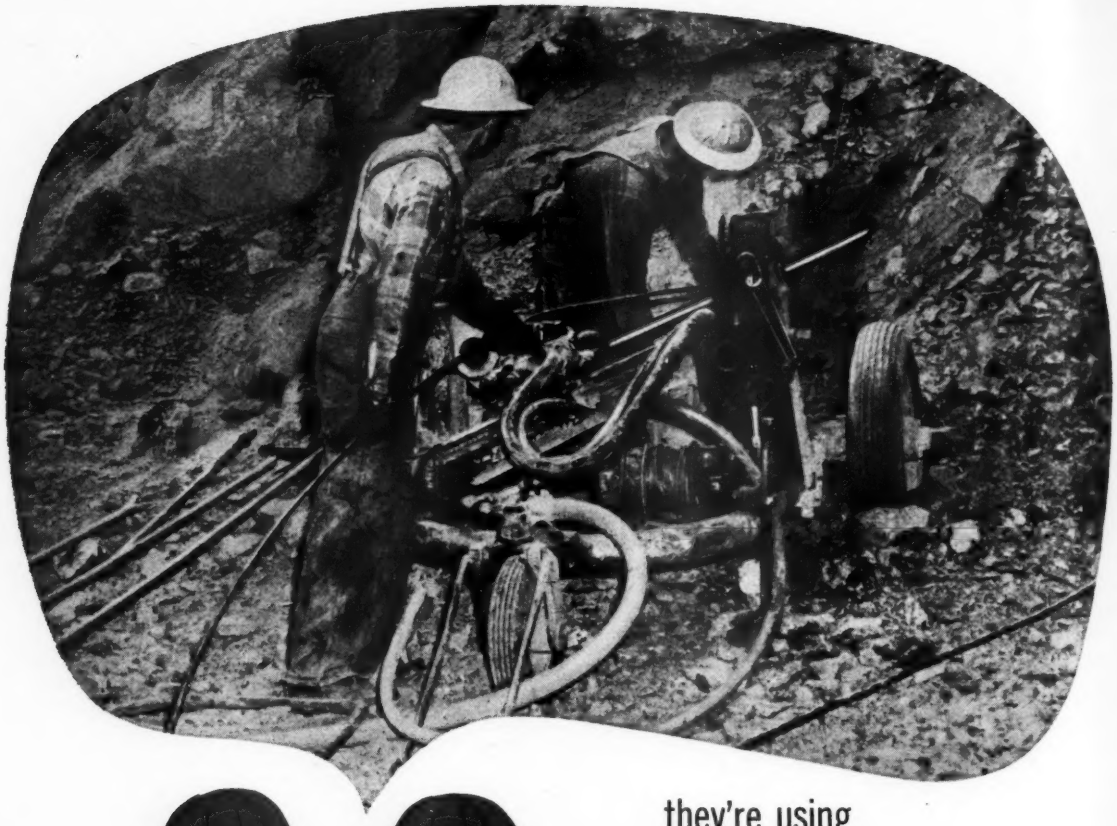
Mining CONGRESS JOURNAL

AMERICAN MINING CONGRESS

AMC

JULY
1954



they're using CRUCIBLE HOLLOW DRILL RODS on the New York State Throughway

This new high-speed superhighway will, when completed, speed streams of traffic across New York State from New York City to Buffalo.

It's a big, difficult construction job on which thousands of tons of rock must be moved. That's why you will find Crucible Hollow Drill Rods in use all along the route. Experienced construction men know they can rely upon the performance of these rods under the toughest field conditions.

There is a good reason for the dependability of Crucible Hollow Drill Rods . . . they are made to *tool steel* standards, by the leading producer of tool and special purpose steels. And this *extra* quality means fewer broken rods and lost bits. *For lowest cost per foot of hole drilled* — specify Crucible Hollow Drill Rods.

CRUCIBLE first name in special purpose steels

54 years of Fine steelmaking

HOLLOW DRILL ROD

CRUCIBLE STEEL COMPANY OF AMERICA, GENERAL SALES OFFICES, OLIVER BUILDING, PITTSBURGH, PA.

REX HIGH SPEED • TOOL • REZISTAL STAINLESS • MAX-EL • ALLOY • SPECIAL PURPOSE STEELS

Cyanamid Congratulates

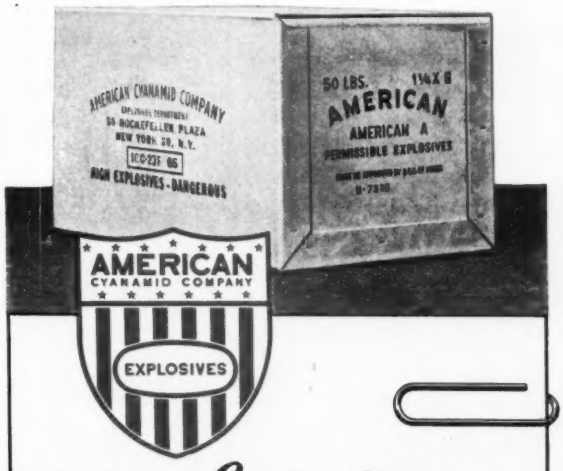
ISLAND CREEK

on 50 Years of Progress in the Bituminous Coal Industry

Fifty years ago, ox teams moved heavy mining equipment into isolated Logan County, West Virginia, and the mining operations of Island Creek Coal Company were begun—months before rail connections to the pit-heads were constructed.

Today, with a record of more than 273,000,000 tons mined and moved, Island Creek is a thoroughly modern and mechanized operation. Mining, processing and shipping are carried out by skilled men and up-to-date equipment in accordance with the highest standards of safety and scientific management.

American Cyanamid is proud to salute this leader in a vital industry, and takes great satisfaction in having been a supplier of quality explosives and blasting accessories to Island Creek for nearly half these 50 years.



AMERICAN *Cyanamid* COMPANY

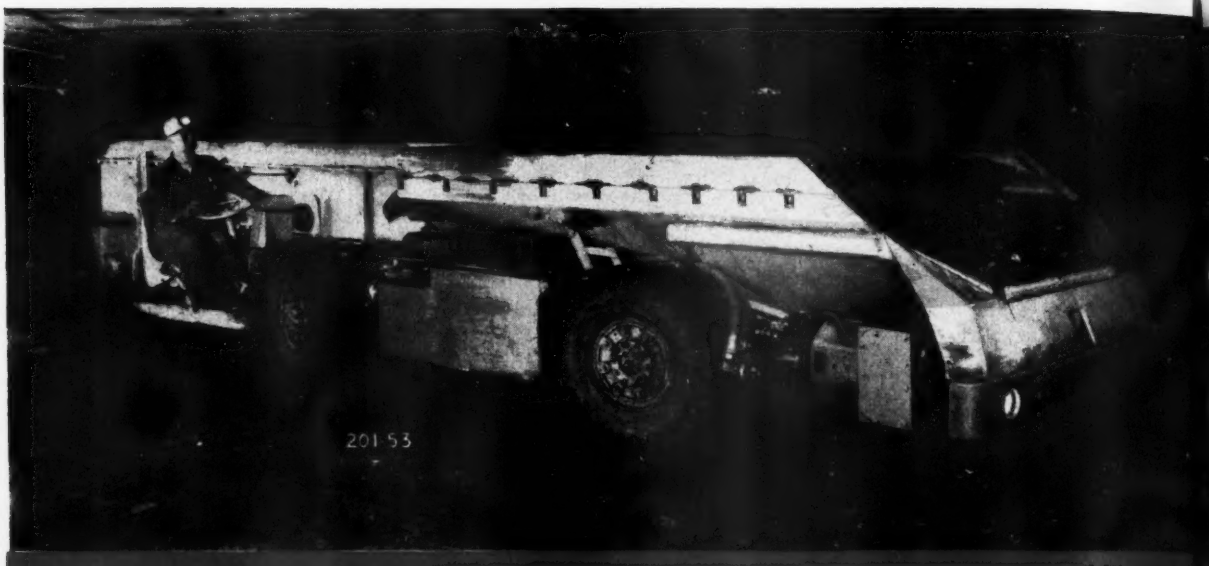
EXPLOSIVES DEPARTMENT

30 Rockefeller Plaza, New York 20, N. Y.

Sales Offices: Pittsburgh, Pa., Bluefield, W. Va., Scranton, Pa., St. Louis, Mo., Pottsville, Pa., Maynard, Mass.

HIGH EXPLOSIVES • PERMISSIBLES • BLASTING POWDER • BLASTING ACCESSORIES

NOW...A COMPLETE LINE



MT66 SHUTTLE CAR, 48" high including sideboards, en route to main haulage system. Operators find Jeffrey cars easy to handle. Model MT66 range is 30" to 42" basic height.

MT68 SHUTTLE CAR, 24" high, gives rapid service from face to conveyor or mine car in low coal. Height may be increased to 30" by use of sideboards.

STANDARD EQUIPMENT

Hydraulic 4-wheel steering
Hydraulic 4-wheel disc-type brakes
Hydraulic conveyor drive, instantly reversible, two-speed
Hydraulic elevating discharge conveyor
Hydraulic cable reel
Progressive series parallel traction control with hand-selective series position
Sealed beam headlights (150 watt) mounted at each end of car
U. S. Bureau of Mines approval plate

THE JEFFREY MANUFACTURING CO.

ESTABLISHED 1877

Columbus 16, Ohio

sales offices and distributors in principal cities

PLANTS IN CANADA, ENGLAND, SOUTH AFRICA.

IF IT'S MINED, PROCESSED OR MOVED
. . .IT'S A JOB FOR JEFFREY!

Models MT 66-MT 67-MT 68

JEFFREY SHUTTLE CARS

Keep your eye on Jeffrey Models MT66 . . . MT67 . . . MT68—a trio of fast, powerful, cable reel shuttle cars, designed for rugged service, high capacity and easy steering under every mining condition.

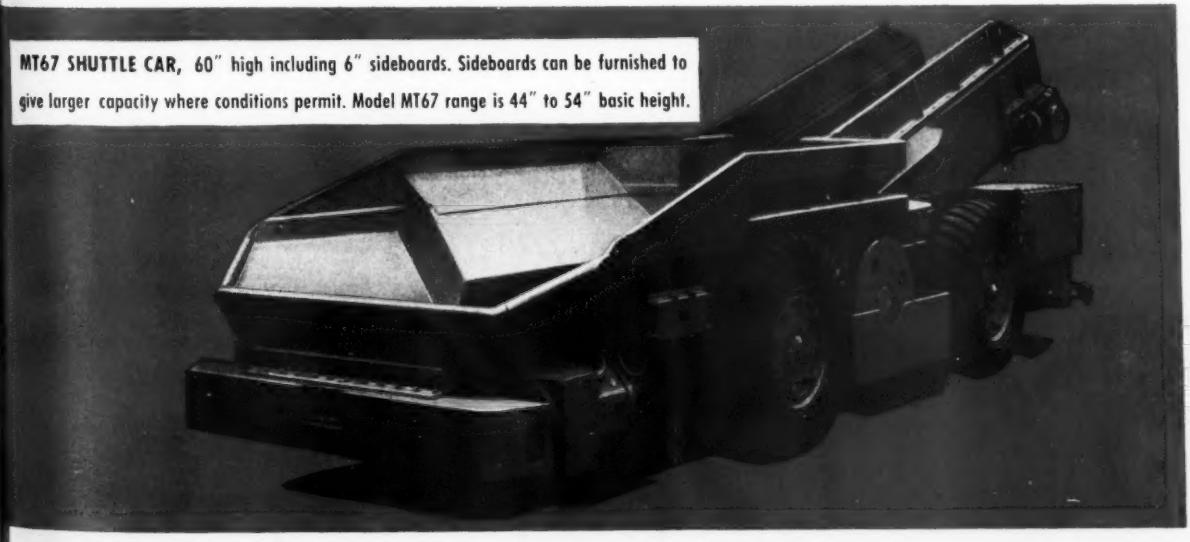
Now . . . Jeffrey offers a complete line of shuttle cars in 24" to 54" basic heights. Their speed and flexibility will save time from loader to main haulage system . . . will increase loader efficiency . . . will cut your mining costs.

Check these ***distinctive, standard*** features:

- ***Instantly reversible conveyor*** enables operator to clear jammed lumps.
- ***Two-speed drive on conveyor*** permits "jogging" at slow speed when loading . . . facilitates unloading to belt conveyors or mine cars at a practically uniform rate — in the least time with a minimum of spillage.
- ***Traction drive*** arrangement is designed for greater car maneuverability and easier steering. Jeffrey shuttle car wheels do not tend to slide sideways on sharp turns.

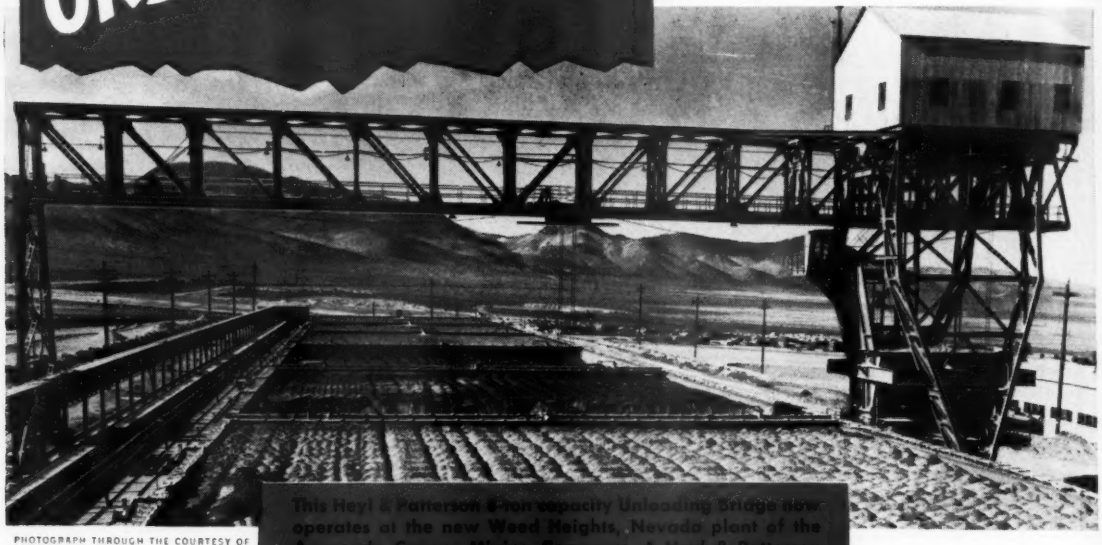
All Jeffrey shuttle cars have 4-wheel drive and 4-wheel hydraulic steering . . . hydraulic brakes . . . discharge conveyor hydraulically driven and elevated . . . easy-to-reach foot operated switches (operator's compartment can be located on either side).

Call in a Jeffrey engineer or write for a bulletin. Get the complete story on modern, low-cost mine transportation from the company making the finest equipment for the coal industry.



MT67 SHUTTLE CAR, 60" high including 6" sideboards. Sideboards can be furnished to give larger capacity where conditions permit. Model MT67 range is 44" to 54" basic height.

ONE OF A KIND... *For a Reason!*



PHOTOGRAPH THROUGH THE COURTESY OF ANACONDA COPPER MINING COMPANY

This Heyl & Patterson 8-ton capacity Unloading Bridge now operates at the new Weed Heights, Nevada plant of the Anaconda Copper Mining Company. A Heyl & Patterson Loading Bridge and a Heyl & Patterson Gantry Crane also function at this new plant.

This Unloading Bridge was specifically designed and built by Heyl & Patterson to perform one definite function for Anaconda Copper Mining Company . . . to dig tailings from the leaching vats at Anaconda's new Weed Heights, Nevada plant and load these tailings, by way of a hopper, into trucks for disposal.

This bridge operates smoothly and efficiently without wasting time, motion or power because it was designed particularly for this one job.

When *your* problem centers around the handling and transportation of ore, coal or other heavy bulk materials . . . the wisest move you can make is to consult Heyl & Patterson, specialists in this field for over 60 years.

Heyl & Patterson has the complete facilities necessary to answer your Heavy Bulk Materials Handling problem. We have our own engineering department . . . our own machine shop . . . our own research department . . . and our own service department.

Call on Heyl & Patterson to help you. An experienced Heyl & Patterson engineer will gladly talk over your problem with you at no obligation.

- Ore Bridges
- Railroad Car Dumpers
- High Lift-Turnover-Rotary
- Coal Preparation Plants
- Coal & Coke Handling Equipment
- Boat Loaders and Unloaders
- Rotary Mine Car Dumpers
- Coal Crushers
- Coal Storage Bridges
- Car Hauls and Boat Movers
- Bradford Breakers
- Refuse Disposal Cars
- Thorsten Coal Sampling Systems
- Kinney Car Unloaders
- Pig Iron Casting Machines
- Cyclone Thickeners
- Thermal Dryers
- The Drying Dutchman
- Reineveld Centrifugal Dryer

Heyl & Patterson, Inc.

"SINCE 1887"

55 FORT PITT BLVD. PITTSBURGH 22, PA.

Heavy Bulk Materials Handling Equipment

All The Way from Design to Erection

JULY, 1954

VOLUME 40 • NUMBER 7

Mining CONGRESS JOURNAL

CONTENTS

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THE AMERICAN MINING CONGRESS
RING BLDG., WASHINGTON 6, D. C.

HOW BUCYRUS-ERIE INDIVIDUAL DESIGN*

Helps Cut Costs Two Ways

1. LOWER YARDAGE COSTS

2. LOWER MAINTENANCE COSTS

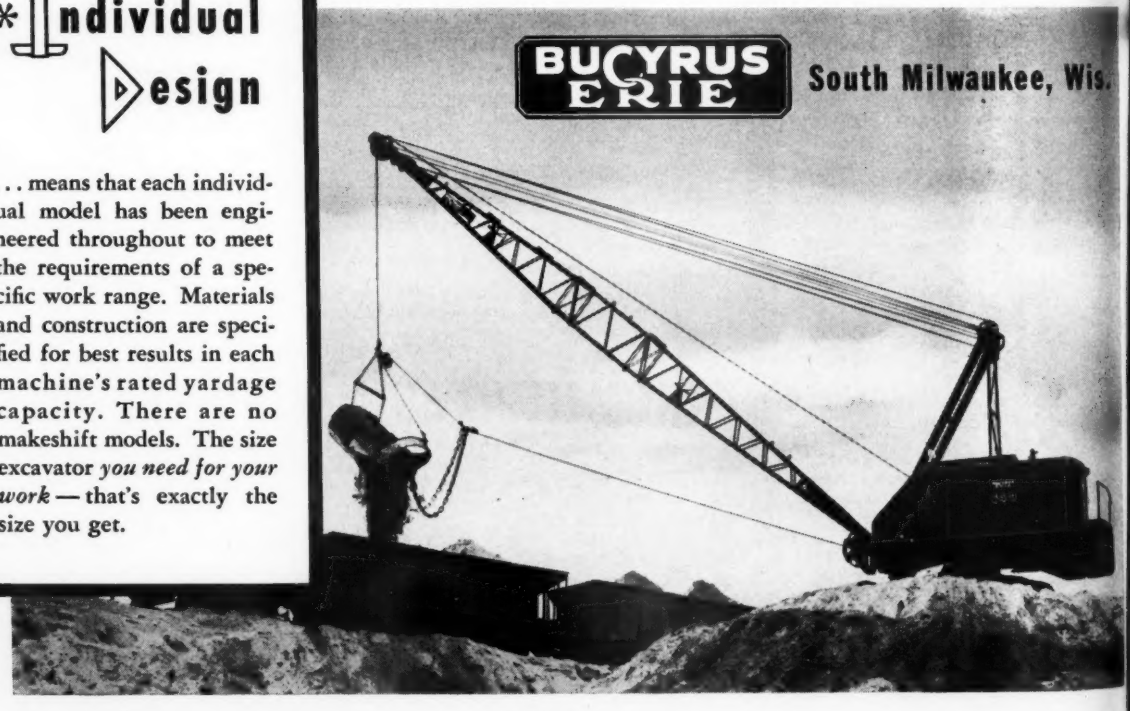
Individual Design engineering brings you what you need for sustained high output over the long pull. Bucyrus-Erie machines are built with just the right combination of power, strength, speed, and weight for economical operation and big output. There's no excess weight, no "over-engineering" to waste power or to slow down performance.

Individual Design is the key to the outstanding dependability and long machine life that Bucyrus-Erie owners expect and get with their machines. Each part of each model is designed to operate at peak efficiency well within safe limits; each has ample strength to carry its share of the work load and to deliver long service life. 25E54

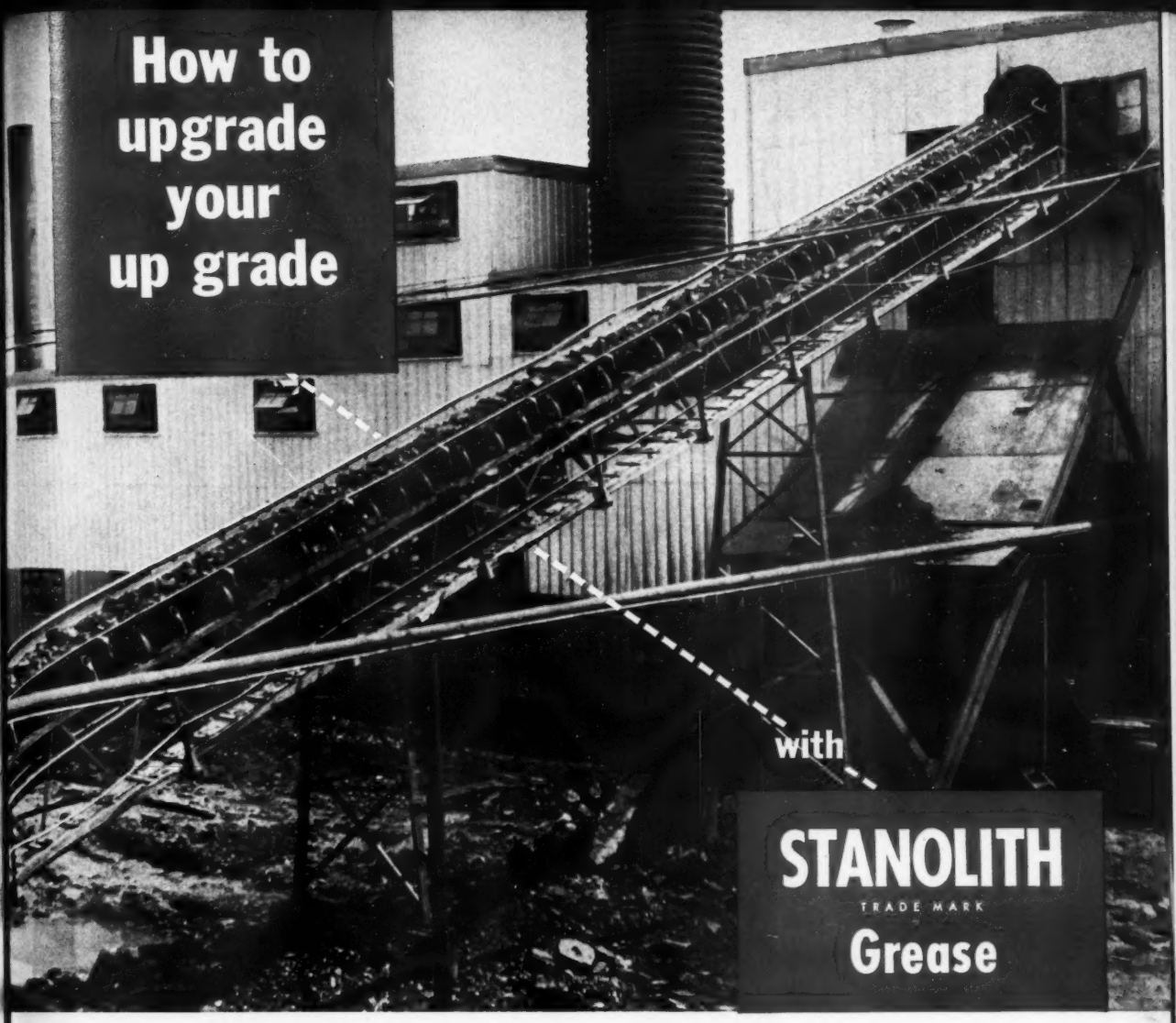
SEE *your Bucyrus-Erie distributor for the complete story on how Individual Design can help reduce the cost-per-yard of output on your mining operation.*

***Individual Design**

. . . means that each individual model has been engineered throughout to meet the requirements of a specific work range. Materials and construction are specified for best results in each machine's rated yardage capacity. There are no makeshift models. The size excavator *you need for your work* — that's exactly the size you get.



How to upgrade your up grade



● A midwest coal mine was getting "fed up" on bearing failures on the large conveyor shown here. Dirt and coal dust, both inside and outside the preparation plant, got into the open bearings and mixing with the lubricant formed a "grinding compound." Some greases leaked out of the bearings. Others hardened and caked, making starting difficult and power requirements heavy.

When a Standard lubrication specialist was consulted he recognized the need for a grease that would seal out the dirt and, while resisting excessive thinning, would maintain a soft consistency at all times. He recommended STANOLITH Grease because it has all these desired qualities. In addition it contains an effective oxidation inhibitor which makes it exceptionally long-lasting.

Lubrication with STANOLITH proved so effective on the conveyor bearings that this grease was also put to work on the shaker screens in the preparation plant. The use of only one grease has simplified both stocking and application. Why don't you investigate how STANOLITH Grease can help *you* increase efficiency?

W. M. "Bill" Griswold of Standard Oil's Evansville, Indiana office is the Standard lubrication specialist who worked with this mine to find the right grease for a tough job. You can get the same on-the-job service from the Standard lubrication specialist in your own area. To reach him, phone your nearest Standard Oil Company office. Or write Standard Oil Company (Indiana), 910 S. Michigan Avenue, Chicago 80, Illinois.

STANDARD OIL COMPANY

STANDARD (Indiana)

McCarthy

COST CUTTING DRILLS
BLAST HOLE DRILLS

TRUCK-MOUNTED HORIZONTAL

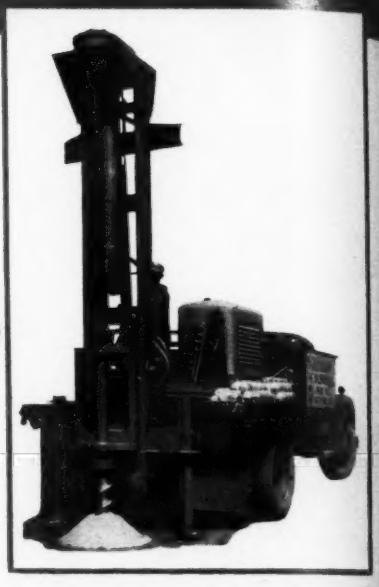
● Satisfied customer reports, "I drill so many more feet per minute with my McCarthy than I did with my old jet rig that I quickly recovered the low initial purchase cost."

VERTICAL DRILL

● "Amazing savings," says Owner-Contractor J. F. Nichols. He drilled six-foot-deep blast holes in 40 seconds each as against 30 minutes each with wagon drills, claims savings of $7500 per month. "Greatest purchase I ever made," says Nichols.

SELF-PROPELLED HORIZONTAL

● A New Castle, Pa., operator reports boring "840,' various depth holes through shale and sandstone, in one working day." Bores 6" and 8" diameter holes at rate of 6' per minute maximum.



Heavy Rugged Powerful

COAL RECOVERY DRILL

● Robert B. Cleghorn, Jr., Hodgeville, West Virginia, reports his hydraulical, self-moving 42" McCarthy Coal Recovery Drill mines "up to 500* tons of clean, low-cost quality coal per day." Cleghorn has a three-man crew—operates in pits as narrow as 34 feet. Operator has total vision, including the highwall. Model 12 handles 24' augers from 16" to 48" in diameter.

● Other McCarthy Coal Recovery Drills handle augers 4', 6' and 12' in length.

MANUFACTURED BY

THE SALEM TOOL CO.

771 S. ELLSWORTH AVENUE, SALEM, OHIO

You Can Save and be Safe with O-B Fused Taps

- Exclusive molded-in asbestos lining in O-B Fused Tap Cases safeguards your men against fuse explosions... lengthens life of tap cases.
- Two vents at top of O-B Tap Cases permit flame from exploding fuse to exit safely without injuring any of your workers.
- O-B Tap Terminals available in different holding strengths from 300 to 2000 pounds to fit your different needs. (Cable broke twice in tests before pulling out of O-B H-1 Terminal).
- Five different O-B Tap Contacts to fit your various needs are heat-tested to assure the lowest resistance electrical path. (See test results in Sept. '53 O-B Haulage Ways).

Ohio Brass

MANSFIELD OHIO, U. S. A.

IN CANADA: CANADIAN OHIO BRASS CO., LTD., NIAGARA FALLS, ONT.

Feeder and Trolley Materials • Control Materials • Trolley Shoes
Roof Bolt Shells and Plugs • Rail Bonds • Automatic Couplers

4500-M

ROOF BOLTS MAKE YOUR MINE SAFER...MORE PRODUCTIVE

YOUR MINE becomes a safer place in which to work when roof bolts are used. Roof bolts promote safety because they consolidate layers of strata into a single, thick beam. This minimizes the possibility of serious roof falls.

Roof bolting also offers these other important advantages: increased production, wider clearances, greater freedom in operating mechanical equipment, and improved ventilation.

All of these desirable operating conditions can be obtained by using any of these four types of Bethlehem Roof Bolts:

SLOTTED BOLT

This 1-in. bolt has a centered, forged slot. No metal is removed in slotting. Opposite end of bolt has 5 in. of rolled threads. Bolt is for use in 1¼-in. hole. When driven against back of hole, wedge is forced deep into slot, expanding the bolt-end. Bolt has truncated-cone point to prevent damage to threads. Usually furnished with American Standard Regular Square Nut.

SQUARE-HEAD BOLTS

Bethlehem manufactures (1) a square-head ¾-in. carbon-type roof bolt having a minimum breaking load of 20,000 lb, (2) a ⅝-in. high-strength roof bolt having the same minimum breaking load, and (3) a ⅞-in. high-strength roof bolt with a minimum breaking load of 40,000 lb.

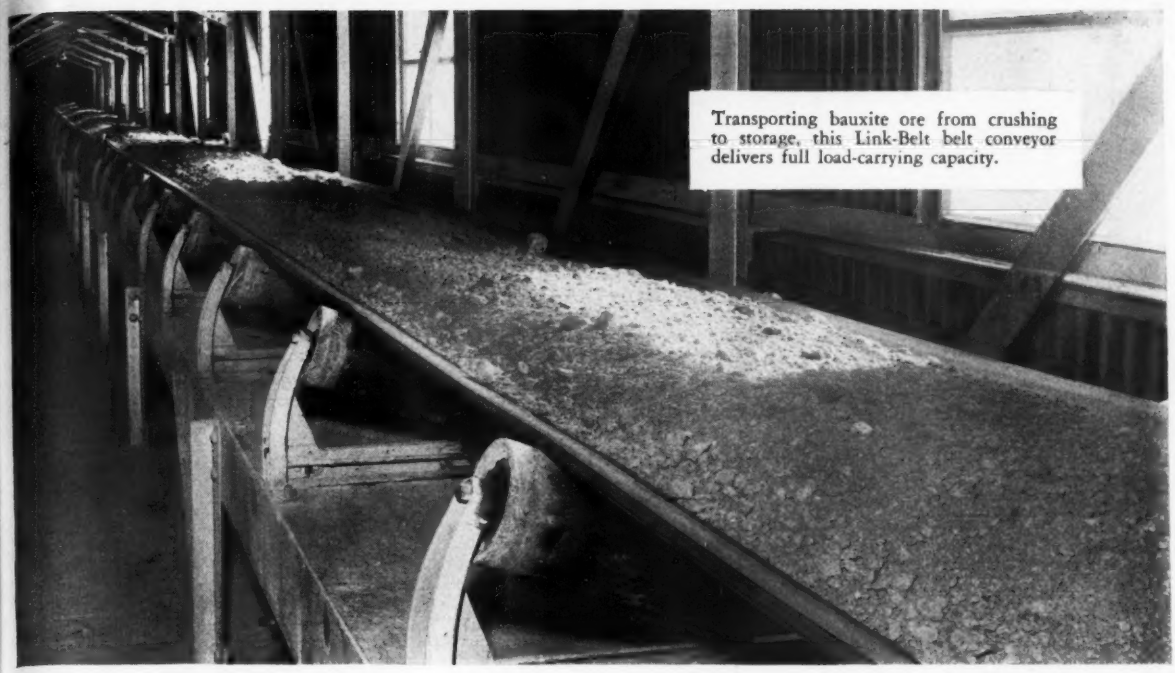
These bolts can be furnished with or without ears on the shanks, to accommodate either the Bethlehem 4-leaf Type C expansion shell or the matching-halves Type F expansion shell.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM MINE ROOF BOLTS



Transporting bauxite ore from crushing to storage, this Link-Belt belt conveyor delivers full load-carrying capacity.

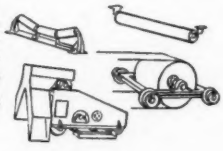
SURE ROAD TO LOWER HANDLING COSTS

... carry the load via Link-Belt belt conveyors

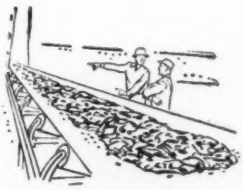
LINK-BELT offers you the "total engineering" so necessary for top efficiency

DESIGNED FOR OVERALL EFFICIENCY—Because of its unrivaled experience, Link-Belt can do a better job of gathering and analyzing all data. Proposals reflect this understanding of the most practical way to fit individual conveyors into your overall system requirements for best results.

BUILT FOR LONG-LIFE PERFORMANCE—Link-Belt manufactures all components and related feeders and conveyors. You are assured of the right equipment because of this breadth of line. And Link-Belt will supply the highest grade belts engineered to the specific job.



DELIVERS FULL RATED CAPACITY—Link-Belt follows through on every detail of the job, including electrical controls and even wiring and foundations. What's more, Link-Belt will furnish experienced erection superintendents, staffs and skilled crews at the customer's request.



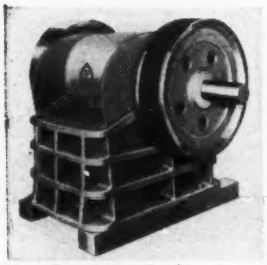
ASSURES SATISFACTORY PERFORMANCE—When you rely on Link-Belt as a single source for your complete system, we accept responsibility for placing it in full operating readiness. We will also supervise modernization of existing systems. For all the facts call your nearby Link-Belt sales representative.

LINK-BELT

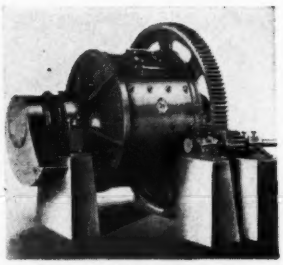
BELT CONVEYOR EQUIPMENT

LINK-BELT COMPANY: Executive Offices, 307 N. Michigan Ave., Chicago 1. To Serve Industry There Are Link-Belt Plants and Sales Offices in All Principal Cities. Export Office, New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World.

13,466-A



Denver Jaw Crusher



Denver Steel Head Ball Mill

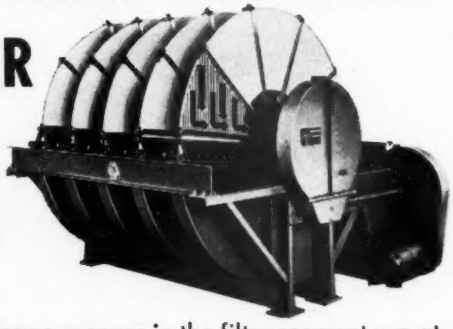
Denver Standard Dryer

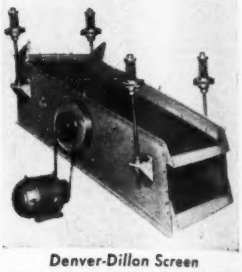
Denver Drum Filter

Denver Diaphragm Pump

DRIER FILTER CAKE WITH...

DENVER DISC FILTER





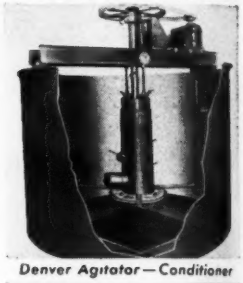
Denver-Dillon Screen

Denver Spiral Classifier

See how drainage grooves in the filter segment run at right angles to the suction edge of the filter segment?

This patented feature on DENVER DISC FILTERS mean positive drainage from each segment; no blow-back of filtrate into filter cake. RESULT: DENVER DISC FILTERS give drier filter cake.

SIZES: 2′ x 1-disc through 6′ x 8-disc and larger.

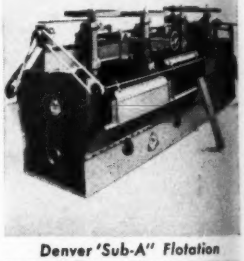


Denver Agitator—Conditioner

Denver Automatic Sampler

OTHER FEATURES:

Divided tank permits filtering 2 products with same filter. Filter segment can be replaced while filter is in operation. Drive mechanism and valves are protected from dirt and slime. DENVER DISC FILTERS are simple in design; simple to operate and maintain.



Denver 'Sub-A" Flotation

Denver Testing Service

FREE FILTER TESTS:

DENVER EQUIPMENT COMPANY will conduct filter tests free of charge to determine proper size and type filter for your requirements. Write today!

Denver Hydroclassifier

"The firm that makes its friends happier, healthier and wealthier"

DECO FLOTATION ENGINEERS

DENVER EQUIPMENT 24 HOUR SERVICE COMPANY

DENVER EQUIPMENT CO.

Denver 17, Colorado
1400 Seventeenth St.
Phone Cherry 4466

New York City 1, N.Y.
4114 Empire State Bldg.
Phone Chickering 4-6510

Chicago 1, Ill.
1123-24 Bell Bldg.
Phone Central 6-2423

Toronto 1, Canada
220 Bay Street
Phone Empire 3-8836

QUESTION*

How much more material is there in a Three-Inch-Higher Windrow . . . 9% . . . 18% . . . 31% . . . ?

Cross section of an average, 21-inch high windrow . . . the area (width x height ÷ 2) is 614 sq in.

Now increase the height of the windrow by 3 in. The cross-section area now equals 804 sq in.

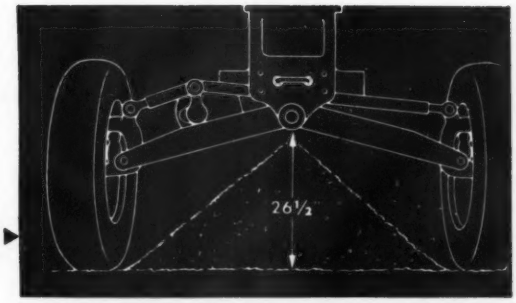
The difference: 190 sq in, over 30 percent more area, meaning over 30 *percent more yardage.*

---

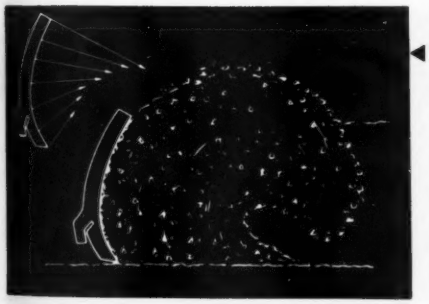
*Only a Combination of Advanced Design Features Lets a Motor Grader Handle Big Loads Fast

To take full advantage of even a *three-inch* difference in windrow height (as explained above) a heavy-duty motor grader needs new design and performance characteristics from front to rear and top to bottom.

Let's analyze the Allis-Chalmers 104-brake-horsepower AD-40 to see how it measures up to these stiff requirements.

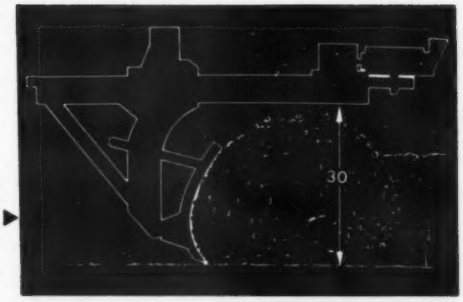


1 **A HIGH-ARCH FRONT AXLE** to straddle big windrows . . . take advantage of that three-inch difference and let big loads pass through to the blade.



2 **A ROLLING-ACTION MOLDBOARD** . . . to insure a "live" load that rolls freely off the blade . . . moves the load faster and takes full advantage of engine power.

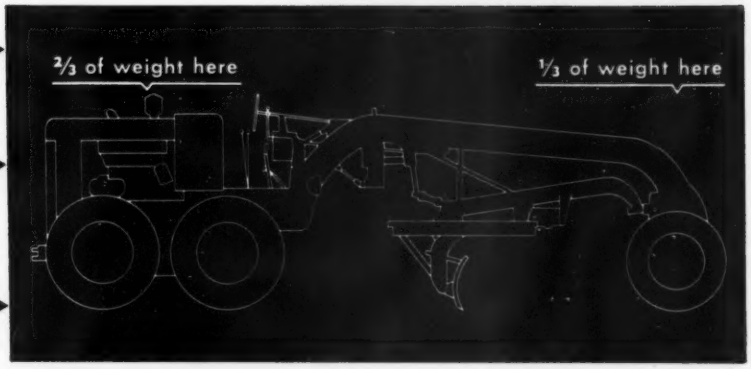
3 **AMPLE THROAT CLEARANCE** . . . to handle 30 percent bigger loads without disturbing free, rolling action . . . and without jamming dirt, oil-mix or any other material against the circle.



4 **FULL BLADE FREEDOM** . . . the exclusive tubular frame and a long tubular drawbar insure full blading effectiveness on the road, in the ditch or on the slope.

5 **BALANCED POWER, WEIGHT AND TRACTION** . . . a heavy-duty engine and *two-thirds* of the weight concentrated on tandem-drive rear wheels provide the best in traction, positive blade pressure and steer-ability.

6 **EASY CONTROL AND VISIBILITY** — A big platform with plenty of leg room, adjustable seat and steering wheel, power steering, assures working ease. Single member frame, low control board and tapered platform corners provide "pilot-house" visibility.



Your Allis-Chalmers dealer will be glad to show you how the AD-40 gives you the *differences* that mean more work done . . . by a demonstration under on-the-job conditions.

ALLIS-CHALMERS
TRACTOR DIVISION • MILWAUKEE 1, U. S. A.

Now a Division of Sanford-Day Iron Works

A Combining of Products, Engineering Ability and Manufacturing Equipment to Serve Mining More Economically

Sanford-Day Iron Works and The Brown-Fayro Company are pleased to inform the mining industry that Sanford-Day has acquired the assets of The Brown-Fayro Co., Johnstown, Pennsylvania. The Brown-Fayro Co. will be known as the Brown-Fayro Division of Sanford-Day Iron Works, Inc. Mr. C. O. Crump, president of The Brown-Fayro Co., will continue as manager of our Brown-Fayro Division.

Brown-Fayro has, for almost 40 years, manufactured room, rigging, car spotting and car moving hoists, mine pumps, hoist and car retarders, mine and man cars, wheels and trucks, rerailers and derailers, mine blowers, sheaves and rollers, check and foot valves and oil spray outfits.

Early in 1917, the "Brownie" room hoist was developed for the handling of mine cars in working places. In 1926 a gravity type railroad car retarder was developed. This was the beginning of the line of railroad car handling equipment which now covers several types and sizes of retarders and hoist-retarders. About 1928, the company developed a slow speed heavy duty car spotting hoist, which was the forerunner of a line which now includes several models. A barney type spotter was brought out in 1941 and a hydraulically operated one more recently. Brown-Fayro pioneered the "cold oil" method for dust control and freeze-proofing of coal.

In 1951 we at Sanford-Day celebrated our fiftieth year of building mine cars and wheels for the mining industry. The automatic mine car haulage system was pioneered and developed by Sanford-Day. In addition, we have originated most of the improvements in design and construction of mine cars and wheels.

Sanford-Day designed and built the first successful anti-friction bearing wheel for mine cars . . . the first low bottom car and the first high capacity rotary dump car. Other firsts were the "ball bearing" mine car wheel, the bottom dumping mine car, the latch lever and the "Twin Safety Latches" for bottom dumping cars. Recently, we designed and began building a revolutionary new granby car for metal mines.

We mention these facts with pride because they have been tremendous factors in lowering the production costs of mining over the years.

Serving the mining industry more economically is the prime factor in the merged experience, ability and products of the two firms. The Brown-Fayro policies that have built a wonderful reputation and confidence in their products will be continued.

BROWN-FAYRO
DIVISION

The "Brownie" Line
Rigging, Car & Haulage Hoists
Car Retarders
Hydraulic Car Spotters
Mine Pumps
Mine Blowers
Cold Oil Spray System

SANFORD-DAY
IRON WORKS

Automatic Dumping Mine Cars
Rotary Mine Cars
Granby Cars
Man Cars
Precision Bearing Wheels

BROWN-FAYRO
AND SANFORD-DAY
TO SERVE MINING BETTER

Sanford-Day Iron Works, Knoxville, Tenn.

Editorials

JOHN C. FOX, *Editor*

JULY, 1954

Where Is It?

LAST September the American Mining Congress Declaration of Policy adopted at Seattle had this to say about a national minerals policy:

"Since it is recognized that the production of the mining industry is essential to national security, we call attention to the startling fact that for years the Federal Government has lacked a constructive domestic mineral policy. We urge that this serious defect be corrected and that such a policy be adopted and announced."

Investigations of the Senate Subcommittee referred to below also focused attention on the need for the adoption of such a policy. During the committee's study the attention of Cabinet officers and Government officials who appeared before it was directed to the urgent need for formulating a real mineral program from the standpoint of both the domestic economy and the national defense.

As a result, perhaps, of the expression of the mineral industry's viewpoint and of the facts brought out by the Senate Subcommittee's investigations, President Eisenhower, on October 28, 1953, appointed the President's Mineral Policy Committee. This committee, consisting of the Secretaries of Interior, State, Commerce and the Director of the Office of Defense Mobilization, was instructed to look into the need for a new vitalized mineral policy and the need for re-evaluating our long-term stockpile objectives. It was instructed to report its findings and recommendations to the President "well before" March 31, 1954.

Based on a preliminary report submitted March 19 by his Cabinet Committee, the President on March 26 authorized the Office of Defense Mobilization to establish immediately new "long-term" stockpile objectives. The announcement of this step carried the following statement: "The complete report of the President's Committee will be submitted to the Cabinet at an early date with recommendations for a long-range program designed to strengthen the domestic mineral industry."

Here it is July and we are again informed that the Cabinet Committee's report and recommendations will be forthcoming "at an early date." True, some constructive action has been taken. It is even encouraging that we can look forward to the day when we will have a real National Minerals Policy, designed to maintain the domestic mining industry as a going concern, able to supply essential metals, minerals and fuels as they are needed for vital military purposes and for our expanding civilian economy. But how soon is "early"' and *where* is our minerals policy?

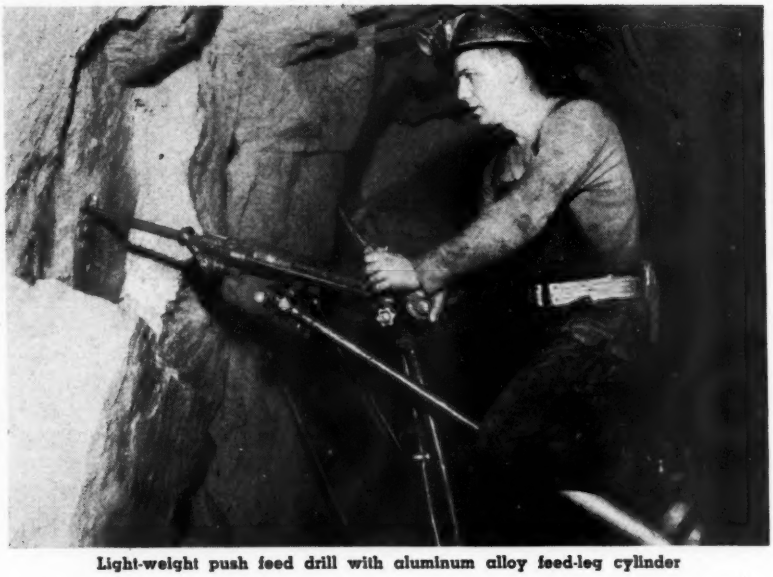
Required Reading

EVERY American should study the report of the Minerals, Materials and Fuels Economic Subcommittee of the Interior and Insular Affairs Committee of the United States Senate. This subcommittee, headed by Senator George W. Malone of Nevada, was authorized by Senate Resolution 143 on July 28, 1953, to determine the accessibility of critical raw materials to the United States in time of war; and to recommend methods of encouraging production of such materials adequate for the expanding economy and the security of the United States.

To carry out the task the subcommittee conducted 58 hearings over a period of ten months, from coast to coast. In the course of its investigations it received testimony from 360 witnesses. Distinguished engineers, military authorities, scientists and experts on securing raw materials during war time counseled and advised the committee during its investigations.

Senator Malone, his colleagues on the subcommittee and the hundreds whose unselfish donations of time and expert opinion contributed so much to this report deserve the hearty thanks of us all.

Every thoughtful mining man recognizes that to supply our expanding economy and to insure our national security we need to supplement our own production of certain metals and minerals with some of the output of our friends and neighbors, particularly in the Western Hemisphere. Somewhere between the extremes of isolation and free trade lies the salavation of the world. The "Paley Report" was a step forward in that it focused the spotlight of attention on one side of the coin. The report of the "Malone Subcommittee" brings out the other side, and calls attention to many of the "facts of life" of the mining industry which are far too little understood by the public. It should receive wide publicity, and thoughtful attention from those concerned with national policy in this vitally important field.



Light-weight push feed drill with aluminum alloy feed-leg cylinder

Drilling Developments At Butte

Jumbo and Push Feed Drill Performance Compared

By A. E. ADAMI, JR.
Underground Research Engineer
Anaconda Copper Mining Co.

MOST recent methods of developing Butte drift headings now employ one of two types of drilling equipment—the single or multiple drill jumbo or the push feed drill. This is not to say that all headings use these, as many of the headings are drilled with underslung, air-feed drifters mouned on pneumatic columns. However, replacement of the older "underslungs" will tend toward one of the first two in the light of tests completed and in progress.

Jumbo use in Butte is exclusive to sills, there being none employed in stopes. Push feeds, although having widest use in stopes and block caving operations, have been used to advantage in nearly all other types of drilling.

Factors influencing the choice between the push feed and the jumbo might include: initial cost, number and size of headings, together with the ground characteristics, service efficiency and the purpose of urgency of the development.

Jumbo Development

The purpose of the jumbo, or mobile drill carriage, is to advance headings more efficiently by; (1) unifying all necessary equipment; (2) providing a mobile unit which can be rapidly set up for drilling and easily torn down at its conclusion; (3) arriving at a desired cross section and minimizing overbreak through proper hole positioning, and (4) reducing operator fatigue by utilizing power to position the drills.

The jumbo idea came into consideration in the early '30s. By 1937 several types of jumbos had been built and were undergoing tests in the Butte mines. Essentially, most units provided an upright column bar with one to four drills mounted on cross arms. Other types in the late '30s and early '40s provided vertical elevation for two drills by means of a hand operated ratchet winch. Crude as they were, these jumbos afforded portability to the equipment, reduced time for setting up and tearing down and, to an extent, more effectively positioned the round.

During this period the need for independent positioning of each drill became evident. The early models, with two drills mounted on a common cross arm from one boom, penalized the faster operator or drill by slowing it to the pace of the other.

Acceptance of these early units was not immediate, due to mechanical difficulties and operator inexperience. However, the potentials of even these first drill carriages were recognized and further development was mandatory.

To this point, the design and construction was done locally, with the limitations of a non-manufacturer impeding refinements. Cooperation of various drill manufacturers was attained and with the purposes and desires of the operators considered, improvements were made.

In the early units the actual drilling was done with one or more hand-cranked drifters having but a two-ft steel change. Then, prior to the war, the advent of the power-feed drifter and the pneumatic column bar simplified both setting up and actual drilling. Both of these were incorporated for use in later jumbos with resultant decrease in set up time and relieved the miner of constant attention to his drill.

Many Experiments Tried

Other mining companies experimenting along these lines exchanged information and designs with Anaconda to their mutual benefit. Drill companies and manufacturers, noting the shortcomings of the home-made jumbos recognized the need and market for an improved jumbo.

World War II delayed many such manufacturers' progress beyond the design stage, but shortly thereafter these companies had produced their trial models for test. The first of such so-called "automatic" jumbos reached Butte in the latter part of 1946 and was sent underground for intensive time and operation study. This was a twin jumbo having hydraulically operated booms and back jack. Mounted upon it were wagon drill type drifters with a six-ft steel change. It was used in both single and multiple heading operations and with some local modifications and changes in its design soon proved far superior to other types of drilling equipment.

Next to be tried were two air-powered models with telescopic type back jacks. Drills for these two jumbos were of the power-feed type also affording a four-ft steel change. Notable was the ability of one man to operate two of these long-feed machines by collaring one machine and, after drilling 18 in. to two ft, starting the other. This allowed the changing of steel and bits on only one machine

at a time thus freeing one man for other work.

In all, six types of "automatic" jumbos have been tested under actual operating conditions in Butte and the latest of these has already, to some extent, made the first model obsolete.

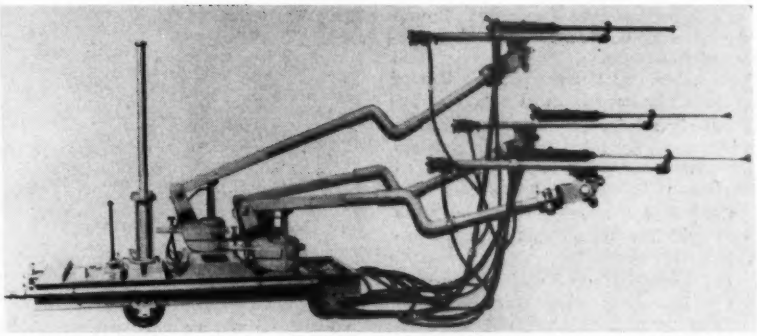
Among the improvements on these latest jumbos are; (1) easier demountability for lowering underground; (2) better balanced carriage affording speedier tramming; (3) more accessible controls for positioning and locking booms, and (4) offset booms which allow drills to be dumped or swung to effect a more standardized round (This offsetting also eliminates the need for a short cross arm at the end of the boom), (5) "self-leveling" features of the boom which decreases the need for "dumping" the drill for each horizontal row of holes, and (6) reduced maintenance and "idle-time" through stronger construction.

Jumbo-mounted drills in Butte are now of either the power-feed, shell-mounted type or the air-feed, underslung drifter design. Both of these allow a standard four-ft change of steel. Aluminum alloys are used to reduce shell weights and cylinders are now being chrome plated for longer life. The three-in. machine has replaced the larger and heavier drifters for use in all but the very hardest faces.

Adoption of the single-use bit of smaller diameter and the use of alloy drill steel, plus the development of drill rounds best suited for jumbos, has furthered over-all efficiency.

Selection of Jumbo Types

One, two and three boom jumbos are now in use in Butte. No hard and fast formula dictates the number of booms,



Three-machine jumbo with hydraulic booms and back jack. Two men operate the three drills on this unit

however, the following factors are taken into consideration:

(1) Size and section of the heading or headings to be driven.

(2) Number of shifts in a 24-hr period, and number of men in the working contract.

(3) Ground hardness and drilling characteristics, which might affect the desired cycle within one shift.

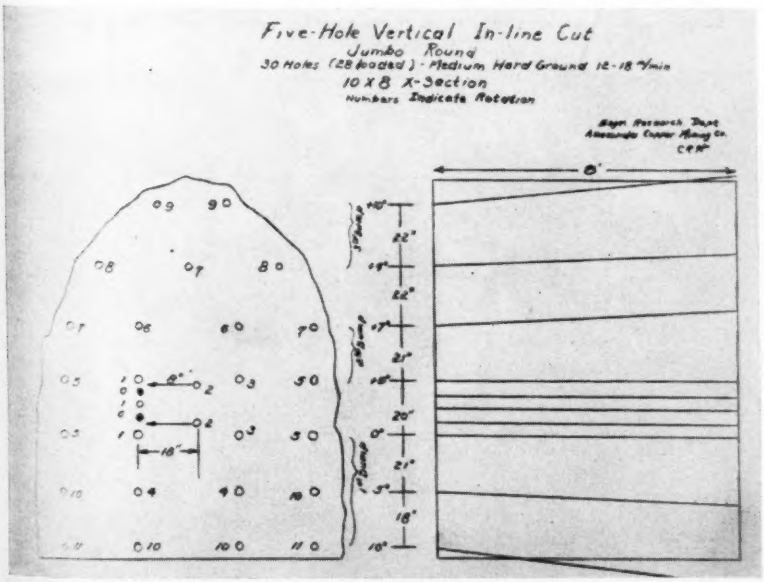
(4) The over-all purpose of urgency of the development.

Changing conditions, particularly with respect to ground characteristics or size of heading may alter drilling requirements. Most manufacturers make provision for alternate mountings of one, two or even three booms upon the same drill carriage. By their addition or removal, the necessity for substituting a complete new unit in the face of changed conditions is limited to a relatively simple underground changeover.

With an expenditure of approximately $3500 for a single-boom jumbo and drill, ranging upward to nearly $9000 for a three-boom unit, such high initial costs must be justified by proportionately greater productivity. Increased footage has resulted from choosing the proper equipment, training the men who use it and utilizing it to the fullest extent possible. Use in multiple headings provides greater realization of the drilling cycle potential and reduces the liability of such equipment when idle.

To the end that it not be idle for any failure within itself, regular lubrication, mechanical inspection and shop overhauls have proven their value. Preventive devices such as air and water screens are in use to filter out foreign matter. Lubricators for both drill and actuating motors have ample oil capacity, with filter screens incorporated within them. One type oiler automatically shuts off the air when its oil supply is exhausted, thus preventing costly repairs and delays.

Looking back at the timber truck carriage of the early jumbos, the hand-cranked drifters, one-in. carbon steel rods and large diameter bits, makes the comparison with the modern jumbo very sharp. Today we are using a choice of one to three booms which can be increased or decreased as conditions warrant. Long feed drifters which necessitate fewer steel changes, mounted upon power actuated booms quickly drill out an effectively breaking round. More than 50 jumbos are now in operation in Butte and have gained operator acceptance through the ease and efficiency they provide.



Thirty-hole round for harder ground using a five-hole "in line" burn cut with two rakers. These "in line" cuts may be placed vertically as shown or horizontally with raker holes drilled under the cut

Push Feeds

Earliest models of this type of drill were tested first in 1949, however comparative data was not obtained until 1952 due to mechanical and handling difficulties inherent in design and construction. These problems resulted from improper balance, feed control position and operation, separate air hoses for drill and leg and foreign matter entering the feedleg.

Production models today have eliminated or minimized these faults and have added flexibility in positioning

with decreased over-all weight. Downstroke rotation for local use has lessened the tendency to plug steel, and has materially lengthened the life of carbide bits used in hard ground.

Nearly all drill manufacturers have added push feed drills to their general line, with some adding specialized equipment for shaft sinking.

Choice of a particular model push feed drill has the following factors involved:

(1) Durability and maintenance.
(2) Handling characteristics, including weight, balance and controls.
(3) Drilling speed and teamwork with carbide bits.
(4) Manufacturer's service and availability of repair parts.

As stated before, greatest usage of the push feed drill has been in stopping and block caving development operations. However, success has been attained in sinking, drilling for rock bolt installations and in certain sill headings and raises. The versatility of the drill is certainly one of its most outstanding advantages, although comparative tests in sill work are limited in scope and number.

Push Feed vs. Jumbo Drilling

Two recent comparative tests have been made wherein the push feed drills have alternated with jumbo operation. The results, while indicative, are not final nor conclusive within those studies alone.

The first comparison involved the driving of a 9½ by 9-ft cross cut in quartz monzonite rated medium hard. Similar conditions of ground hardness, air pressure, service, etc., were encountered in both methods. Drills used were two 2⅝-in. telescopic leg push feeds which collared and drilled out with a 101-in. steel and two jumbo mounted 3½-in. power feed drifters having a four-ft steel change. Steel, one-use bits were used by both, two miners drilling.

Significant observations included the following:

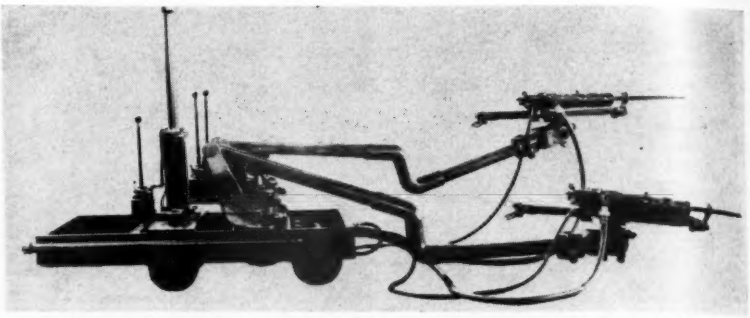
(1) Average over-all time for setting up and tearing down gave the push feed a 32 percent advantage (11 minutes less).

(2) Actual drilling speed in average in. per minute showed the jumbo drifters 19 percent faster. Moving from a finished hole and collaring a new one showed a 37 percent advantage to the jumbo, due mainly to the single long steel used with the push feed. Need for steel changes was eliminated in push feed use, thus saving an average of ½ min. per hole.

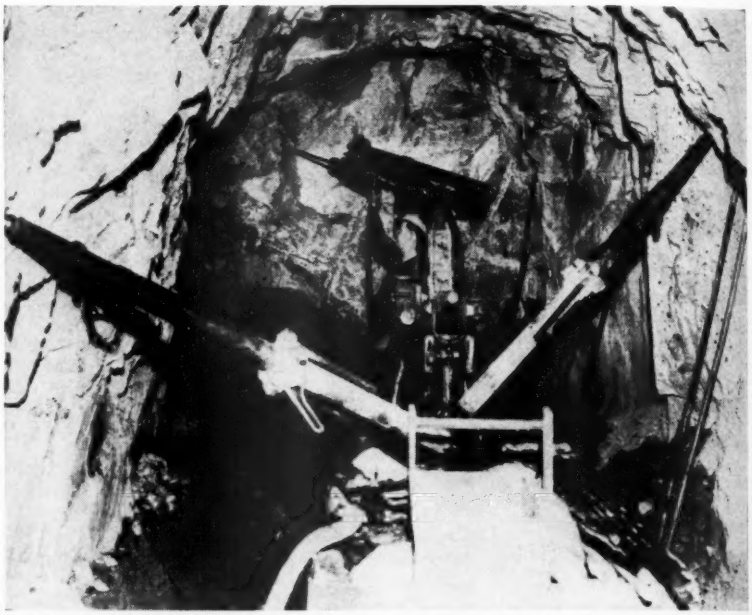
(3) In average footage advanced per man shift, jumbo usage had a 26 percent advantage on the basis of total mining time.

(4) Advance per blast was nearly identical, being only two percent greater with the jumbo.

(5) Steel breakage by the larger



Two-boom unit mounting power-feed drifters. Booms and back-jack are hydraulically operated



Single machine jumbo with air-feed drifter on air-powered boom is anchored with air-feed jacks

Single-machine jumbo with air-feed drifter on air-powered boom

Headings all 9 x 7	Type Equipment	Cycle	Av. Ft Adv. per Man Shift
A	2-Telescopic Push Feeds	8'-3 Men	1.69
B	2-Telescopic Push Feeds	5'-2 Men	1.76
C	2-Push Feeds	8'-3 Men	1.39
D	2-Boom Jumbo	8'-3 Men	2.28
E	2-Boom Jumbo	8'-3 Men	1.84
F	1-Boom Jumbo*	8'-3 Men	1.86
G	1-Boom Jumbo*	8'-3 Men	1.85
H	1-Boom Jumbo*	8'-4 Men	1.63
I	1-Boom Jumbo*	8'-3 Men	1.28

* Using two drifters on a common cross-arm.

(In determining advance per man-shift, all shifts worked at tasks other than advancing the heading and rock bolting were subtracted.)

jumbo drills was far greater than with the push feeds, also contributing to the delay time.

(6) Drill breakdowns were less frequent with the drifters although the push feeds were much newer.

(7) Over-all utility of the push feed enabled necessary drilling for rock bolting and miscellaneous work.

(8) Physical effort was noted to be less in jumbo operation although push feeds created less noise and exhaust fogging.

(9) Delays due to stuck drill steel were fewer with the collared type push feed shanks.

(10) Equipment cost comparison shows a great difference—necessary push feed drills costing 65 percent less than the jumbo carriage and drills.

In this comparison it must be pointed out that the miners were experienced in jumbo use but lacked complete familiarity with the push feeds.

The second comparison did not involve alternate use of the two methods in the same heading but rather several headings of comparable size and ground characteristics employing one of the two types of drilling. Two cycles were found practical, the five-ft round-out-round-in with two men per shift, and the eight-ft on a three man set up wherein two men drill, blast and rock bolt, a third man mucking out on the opposite shift during the 24-hr period. All studies were for a six to ten-week period.

(1) Push Feed operators in this study had the benefit of longer experience than did the miners in the first comparison, showing to advantage in results.

(2) Exceptional ability and experience of the miners driving heading "D" with a jumbo accounts greatly for their performance, as did their particularly effective drill round.

(3) Single boom jumbos mounting two drills did not allow a proper round pattern nor provide the advantages of independent drill positioning.

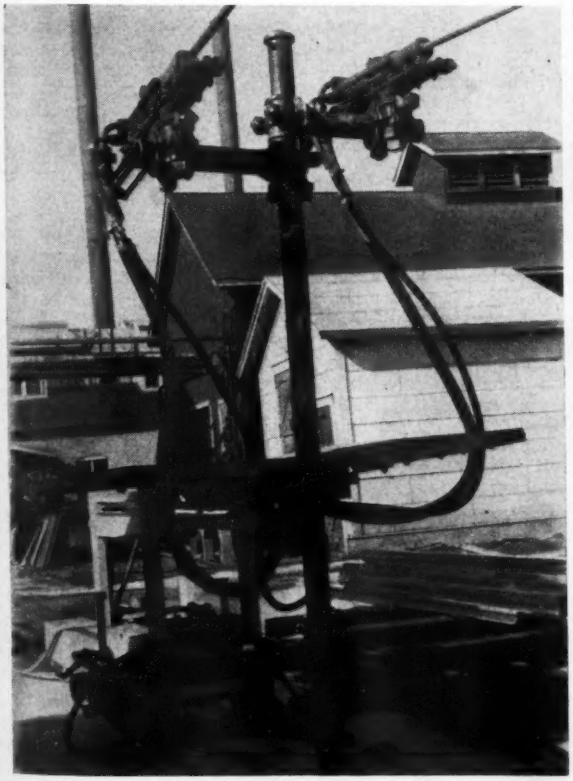
(4) Rock bolting in jumbo headings required the use of a stopper for drilling due to lack of maneuverability of the drifters for this work.

Favorable Comparison

From these two studies, it was found that the push feed drill compared favorably with the jumbo in certain headings and under many conditions. Certainly, from a cost standpoint and for over-all mining usage, it has preference. Yet to be determined are: Its service life, long-term maintenance cost and proper round cycling under many varied conditions.

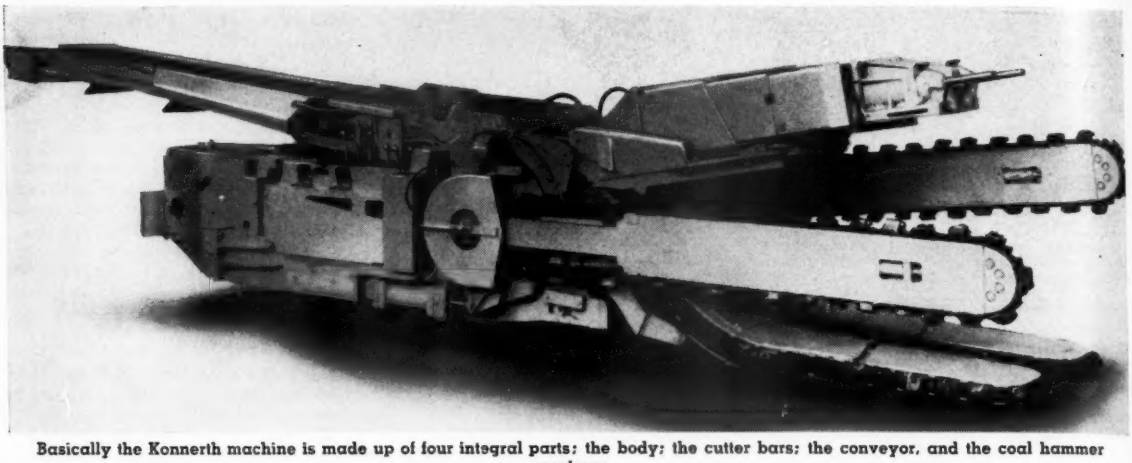
Utilizing carbide bits on jumbos, with smaller, faster rotating drills possibly using down stroke rotation to advantage, and shortening set up time will materially aid efficiency of this unit.

Subsequent long range studies, where the two are used to the optimum, will disclose more of their potentials and limitations for sill development.



Early four-machine jumbo with handcrank drifters mounted on vertical column bar

Conventional underslung drifter mounted on pneumatic column bar



Basically the Konnerth machine is made up of four integral parts: the body; the cutter bars; the conveyor, and the coal hammer carriage

The Konnerth Mining Machine

New Type Miner Embodying Unique Principle is in Successful Operation

By R. C. BEERBOWER, JR.
Superintendent, Karen Mine
United States Steel Corp.

AS chief electrical engineer of the H. C. Frick Coke Co., Karl Konnerth started a dream toward reality by basically experimenting with a new and unique method of breaking coal from the solid. This was to be accomplished by utilizing a source of vibration, applied to the coal face under sufficient pressure and at the proper frequency to fracture and separate it from the bed. The development of the idea was not an easy matter. To begin with there were no large electric hammers available. A Pittsburgh manufacturer had developed an electric tie tamper for railroad service and several of these tampers were procured for experimental purposes.

After many trials and failures it was decided that the original frequency of 750 blows per minute should be increased and a crude hammer, capable of delivering 1500 blows per minute, was made. The first test in coal with this hammer was gratifying and paved the way for the future development of an electric coal hammer for production of the vibrational forces to break down the coal. Since the principle was feasible, it was decided to build a complete experimental machine, combining such features as cutting and loading, along with the breaking down of the coal. To expedite the building of the machine and further demonstrate its application without spending an excessive amount of money, a standard low vein, shortwall cutting machine was selected as the base structure upon which the entire machine was built.

Evolution of the original model produced a machine which had sufficient mobility, flexibility and the proper cutting and loading capacity. It could now be put to work on an experimental basis in the Leckrone mine as a coal producing machine. In 1948 the machine was reworked to include additional improvements and was sent to the Leisenring No. 3 mine. Here it was studied as it produced coal at a respectable rate and excellent cost for approximately two years. As a result of this study it was decided that the Konnerth mining machine should be built in quantity and placed in service as regular production units.

Machine Operation

Basically the present machine is made up of four integral parts: (1) The main body, which includes the motor, transmission case, hydraulic tank, pumps and caterpillar drive units; (2) cutter bars; (3) conveyor, and (4) the coal hammer carriage.

The machine is powered by one 500-v compound wound dc motor. It is totally enclosed, fan cooled and is rated 70 hp for three hr or 90 hp for one hr. All operations such as cutting, tramming and conveying are performed mechanically and are controlled through hydraulically operated disc clutches. All positioning operations are performed by hydraulic power which is provided by pumps through an independent hydraulic system. The caterpillar drive units are operated at a tramming speed of 104 fpm and a sumping speed of 36 in. per minute.

The bottom bars and chains serve the dual purpose of undercutting the coal and conveying it from the mine floor to the discharge conveyor. Coal is conveyed by the cutter chains and bits in the 11-in. space between the bars. The 43 blocks making up each chain are connected with universals, so that the chain can follow the vertical angle in the bars. The speed of these chains is 315 fpm. The standard 9 ft 9 in. shear bars are mounted rigidly on both sides of the machine and swing independently through vertical arcs from top to bottom. Standard cutting chains made up of 41 blocks each are used on the shear bars and are driven at a speed of 390 fpm.

Coal is discharged by the combination conveyor-cutter chains into a hopper located in the center of the main body of the machine. It is moved from the hopper to the shuttle car by a single chain, flight type conveyor, which travels at a speed of 290 fpm. The chain operates in a conveyor boom which extends eight ft beyond the rear bumper of the machine and will swing 65° to either side of center, and can be elevated 38 in. above the horizontal at the discharge end.

The hammer carriage is located di-

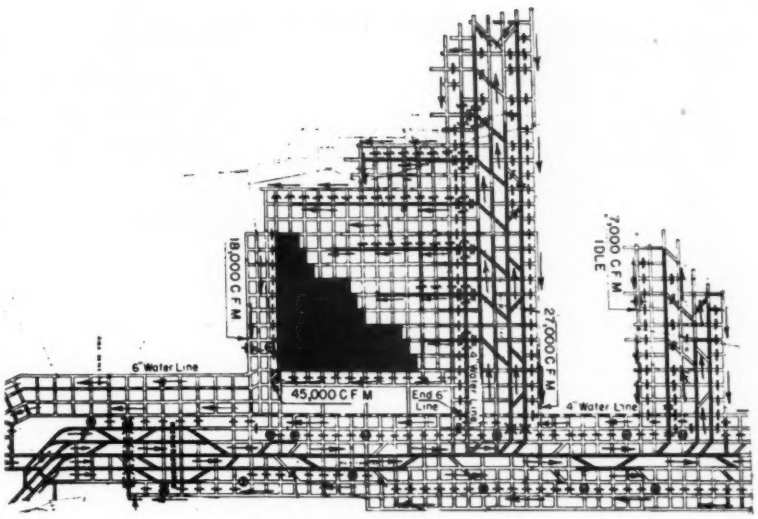
rectly above the bottom bars and hinged to the main frame. Hydraulically operated cylinders raise and lower the hammer carriage to a maximum of 80 in., extend and retract the hammers on the carriage to a maximum of 34 in., and swing the hammer carriage turntable to the left and right within the limits of the shear bars. Through these limits the vibrating hammers can be utilized to trim roof and break down the coal at the face.

Hammers Vibrate Coal Down

Coal vibrating hammers consist of a barrel or cylinder, upon which are assembled two pulsating current electro magnets, the laminated iron of the electro magnets being solidly welded to the cylinder to form a unit assembly. Inside the cylinder, two bearings are positioned, one at each end, for the purpose of carrying the piston or core, which is free to slide back and forth between them. The piston stroke is established by means of a core stop positioned at the back end of the cylinder and the vibrating tool shank positioned in a tool bushing located at the other end of the barrel. A preloaded coil spring holds the core stop in position and absorbs the impact energy on the return stroke of the piston. On the tool end a preloaded coil spring positions against a spring seat and serves to limit the travel of the vibrating tool when operating in free air and not against a coal face.

In operation, each coil or electro magnet is excited alternately by single phase alternating current through an oil immersed selenium rectifier, thus producing a pulsating direct current, which is in step with the frequency of the alternating current supply. The piston (or core) is reciprocated, striking the tool at one end and the spring loaded core stop at the opposite end. Stroke length is established by the difference between the over-all length of the piston and the distance between the two stops. The normal power supply to the rectifier must be 150 v 30 cycle and the over-all ac input to the hammer under normal operating conditions is 80 to 90 amp.

The number of piston strokes is established by the 30-cycle frequency when rectified, giving 30 x 2 x 60 or 3600 total reciprocations and since only half this number strike the shank of the tool, the resultant cyclic speed is 1800 blows per minute. The force of each blow, measured by a strain gauge with the hammer mounted on a special test stand, is approximately 30,000 lbs.

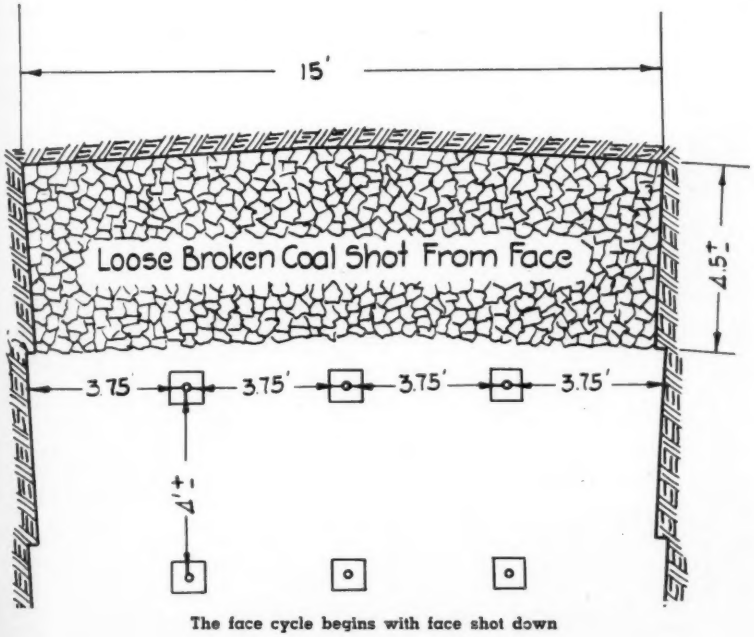


Ventilation plan for Karen mine

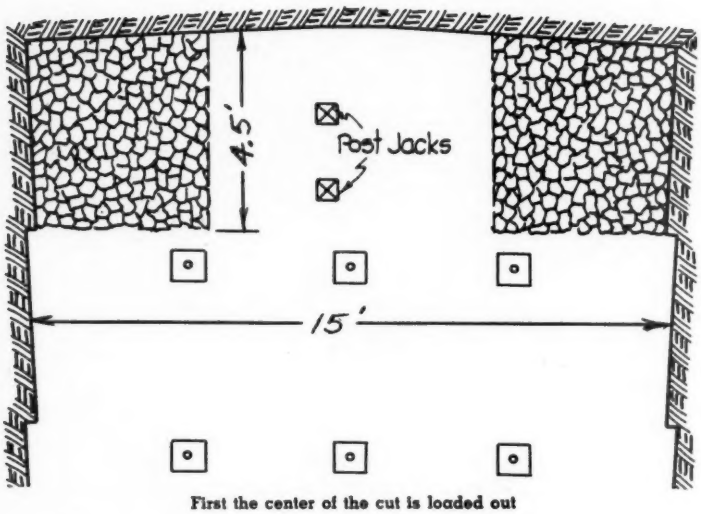
Power for the electric hammers is supplied through a nine-conductor cable, from an explosion tested motor generator set, consisting of a 15-hp, 500-v, dc motor directly coupled to a 28.8 kva, 160-v, 30-cycle generator and a 3 kw exciter for generator excitation. The unit and the starting resistance and contactors for the dc motor on the machine are mounted on a portable three wheeled truck which can be parked in a breakthrough within approximately 550 ft of the machine. The limit of this distance is controlled by the length of cables that can be practicably handled between the motor-generator set and the machine.

Physical dimensions of the standard model Konnerth machine are as follows: 6 ft 6 in. wide, 22 ft 6 in. long over the main body, with an additional eight-ft overhang of the rear conveyor, making the total over-all length 30 ft 6 in. The tramming height is 48 in. and the maximum mining height is 80 in. Weight of the machine is approximately 46,000 lb. The only difference in dimensions between the standard model machines and the high model machines which are now being built is tramming height and maximum mining height. In the latter case these figures are 54 in. and 96 in. respectively. A low model machine has been designed with a tramming height of 37 in. and a maximum mining height of 74 in.

Operator control levers are provided on both sides of the machine at a point 11 ft back from the end of the cutter bars. The starting controller and reversing cylinder are mounted on one side of the machine only, but an emergency stop switch is provided on both sides of the machine.



The face cycle begins with face shot down



First the center of the cut is loaded out

Mining Conditions

The Konnerth machine is being used in several mines of the U. S. Steel Corp., but the following description is of the machine as it pertains to Karen Mine, which is located on the Monongahela River, six miles west of Brownsville, Pa. Mining is in the Pittsburgh seam, which averages seven ft in thickness in this locality. The seam is overlaid with 10 to 12 in. of weak drawslate, which tends to fall with the coal in conventional mining, and which will fall in any event if left unsupported for even a short time. Above this is 10 to 12 in. of wild coal and bands of sandstone, which vary in structure and thickness to the surface. In faulty areas the drawslate and wild coal bands vary from zero to several feet in thickness. Cover over the property varies from 40 to 350 ft. The seam bottom is fire clay, which causes considerable difficulty on shuttle car haulage roads if saturated with water.

General dip is about 1½ percent toward the southeast, although in local swags and rolls, grades of up to five percent have been encountered. The mine is being developed to the rise, and very little water has been produced in mining operations to date. Coal crops out on the river side of the property and has been mined out many years ago on the other three boundaries. No gas has been found in the mine to date.

Early in 1951, an operational plan was completed for Karen Mine with the express purpose of providing the Coal Division of the Steel Corporation with new productive capacity at curtailed unit operating costs. It was decided that this could best be done by installing Konnerth mining machine units. Production was forecast at 4000 tpd from 12 operating units on a two-shift basis. Underground mining was started from a high wall through two drifts on August 6, 1951. Production was hand loaded by a limited number of men until September 1, 1952, when the first Konnerth unit was put to work.

As the machines were delivered and crews were trained, additional units were started. By September 28, 1953, 12 units were working on development, following a projection which was designed to establish a rib line as quickly as possible with a minimum amount of territory opened up. By the end of 1953 the planned production of 4000 tpd had been reached and is now being maintained and frequently exceeded.

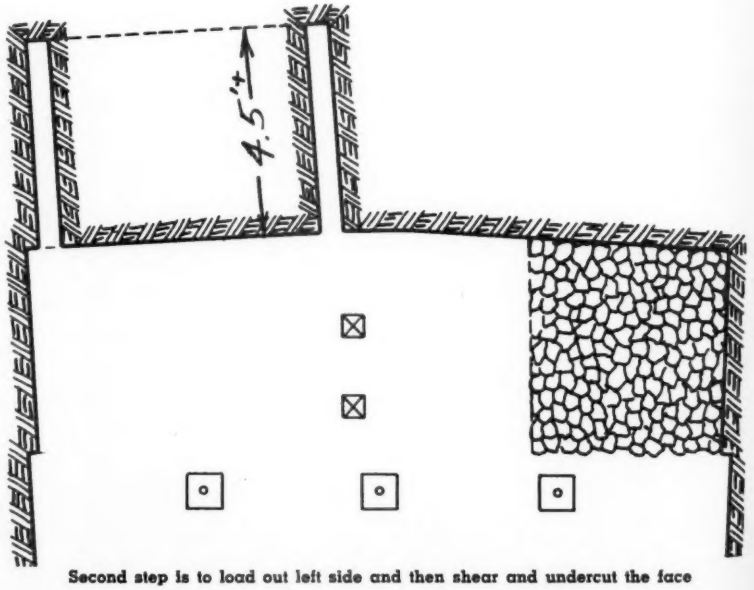
Mining Plan

The mine projection provides eight main entries. Approximately in the center of the field, these entries are driven 16 ft wide on 75-ft centers, with cross cuts turned every 85 ft. The four middle entries are on intake air and the two center entries of these four are graded and laid up with 60-lb track and ballasted with slag to provide main line haulage and sidetracks. Two entries on the left and right side of the mains are used as return air courses.

Seven butt entries are driven off the mains to the left and are projected approximately 4000 ft to the property boundary. These entries are on 85-ft centers and are held to a maximum width of 16 ft. Crosscuts are driven on 85-ft centers. Rooms are turned off the butt entries in sets of three by two machines. The rooms and crosscuts are on 85-ft centers. A "push-in" tail track is laid up in the center room and a loading station is built every three blocks or 255 ft. Rooms are driven a distance of 1020 ft. Four bleeder headings are developed on 65-ft centers across the top of the three rooms before the extraction of pillars is begun.

The start of each pair of machines is timed so that a three block lead can be maintained between each set of rooms on the rib line. When the rib line is fully established across the butt panel, there are six machines working in pairs on rib extraction, four machines working in pairs on room development, and two machines working on the development of butt entries. Five butt panels, with dimensions equal to the one just described, will be mined out one at a time from the left side as the main advance; and five similar sized panels will be mined successively from the right side on full retreat.

Standard crew size on each Konnerth unit is four men. Their job classifications are: one miner operator



Second step is to load out left side and then shear and undercut the face

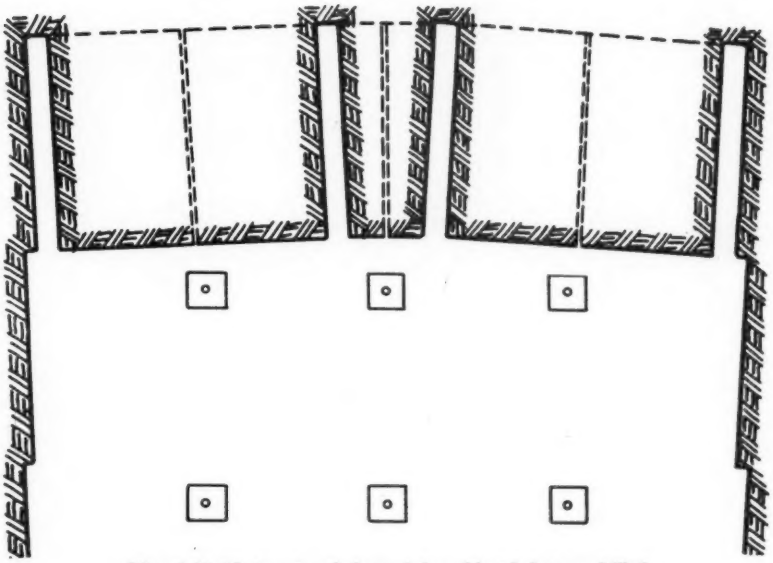
and three helpers. Specific duties are not assigned to the three helpers for they operate as crew members and are responsible for all the preparation work done in the territory in which the machine operates. Each of the helpers is familiar with the operation of the machine, the operation of the shuttle car, and the roof bolting cycle at the face.

The standard pattern used for spacing roof bolts consists of three bolts, on four-ft centers, in a row perpendicular to the rib. The rows of bolts are installed on four-ft centers as the face advances. Installation of the roof bolts is a part of the face cycle while the machine is operating. It is believed that the successful supporting of the drawslate is predicated largely upon the principle of opening the least amount of unsupported roof area and installing roof bolts in that area with the minimum time interval. No conventional timbering is used in the entire mine with the exception of the break row posts in pillar drawing.

Coal at Karen Mine has a "toughness" characteristic that differs from other mines where the machine has been tried. Where excessive time must be spent in vibrating the coal from the solid, it is advantageous to drill one hole four ft deep in each of the three segments of the face bounded by the shears, and shoot each hole with two sticks of permissible explosive.

Machine in Operation

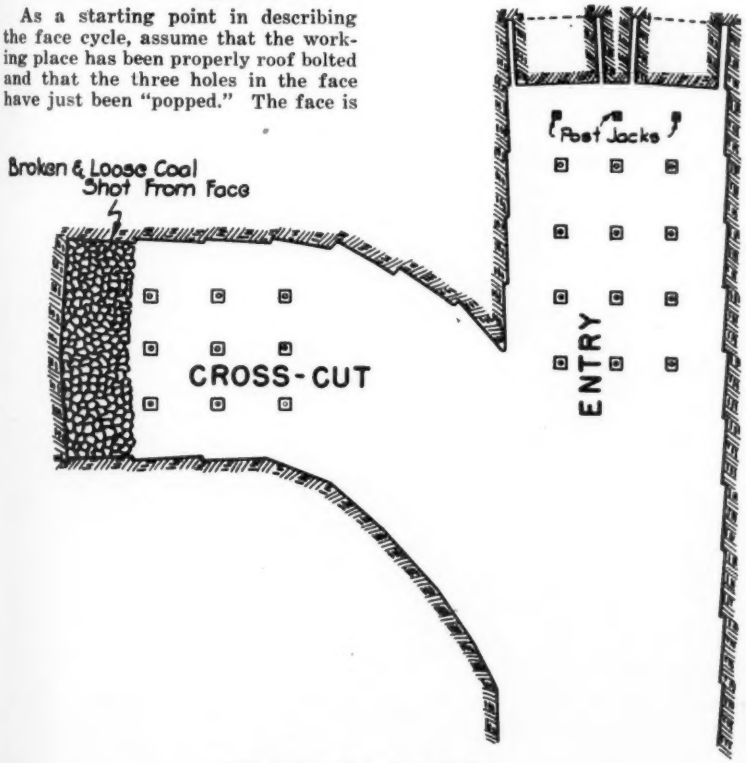
As a starting point in describing the face cycle, assume that the working place has been properly roof bolted and that the three holes in the face have just been "popped." The face is fractured and a portion of the coal has dropped to the mine floor.



After right side is cut and sheared three blast holes are drilled

The Konnerth machine first sweeps up the loose coal in the center of the entry by advancing to the solid coal face, trimming the roof with the hammers on the way. The machine then backs out and post jacks are set as temporary roof support in this area.

Without stopping, the Konnerth machine swings to the left side of the place and sweeps up all the loose coal as it advances, trimming the roof to the desired mining height with the hammers. When the solid coal face is reached, the shear bars are raised to the desired mining height and the undercutting bars are positioned at the bottom of the seam, and the machine sumps in approximately 4½ ft. The forward advance of the machine is stopped and the shear bars are brought down through an arc from their raised position until the shear cut is completed from top to bottom.



Cross-cuts are turned gradually

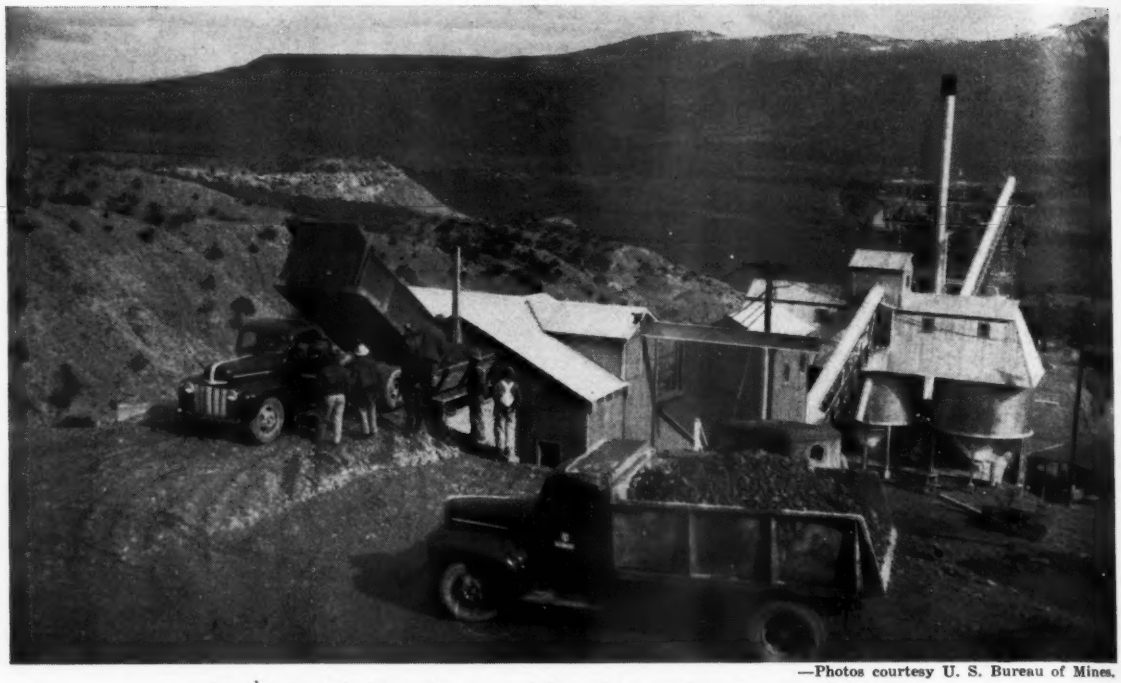
Next, the machine moves to the right side of the place and repeats the procedure. While the right side sump is being made, two crew members move up to the face and hook a temporary pipe guard between the two post jacks to prevent accidental contact with the front end of the machine. They bring in the roof bolting equipment, drill a hole, and install the left roof bolt. It is usually possible to install the center roof bolt when the shuttle car is traveling to the loading station.

Upon completion of the right side sump, the machine moves back 10 ft from the face and stops in the center of the entry. The crew men divide into teams and simultaneously drill a hole and place the third roof bolt on the right side and drill three coal holes in the face. After the three holes are loaded up, they are shot one at a time and the cycle is completed. Another one is started immediately.

An application for patent has been filed covering the method of mining involved in the face cycle described above.

Delay time experienced due to shooting and roof bolting is eliminated when two adjacent working places are avail-

(Continued on page 27)



—Photos courtesy U. S. Bureau of Mines.

Oil Shale is trucked from the mine and dumped into crushing unit at treatment plant

Oil Shale—Vast Reservoir of Energy—Part II

Retorting and Refining Methods in Pilot Plant Stage—Low Production Costs Seen

By TELL ERTL

Chairman
Department of Mining and Petroleum Engineering
Ohio State University

Part I of this article in the June issue of MINING CONGRESS JOURNAL described the method of mining and transportation and gave a brief history of oil shale mining. Part II describes the processing needed to produce shale oil from oil shale.

PRESENT plans in the development of oil shale are to use the largest size crusher commercially available. Run-of-mine size oil shale, which may include pieces more than one cu yd in volume, will be brought to the crusher in the 22-ton rear dump trucks and dumped directly into the primary crusher by means of a cross-over dumping arrangement. The crusher will be 60-in., or larger, gyratory in order to take both the maximum size of mined oil shale and the entire output of one mine. It will have an outlet setting of about 15 in. The minus 15-in. material will be fed directly into secondary gyratories and crushed to minus six-in. The Union Oil Co. of California retort and possibly the USBM gas combustion retort both will use minus six-in. oil shale. The fines, probably minus ⅜ in., will be screened from the feed of the Bureau retort; the Union retort is expected to use the entire range of sizes.

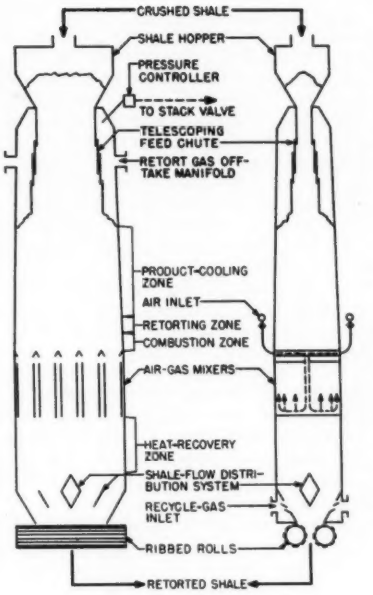
Two Retorts Now Used

Over 2000 patents have been issued on oil shale retorts. Numerous types are used in foreign oil shale operations. Very few, if any, of these are continuous. The commercial American oil shale retort will have to satisfy four criteria. First, to provide high throughput and low cost operation, it must be a continuous type. Second, because Western Colorado is a semi-arid region, the oil shale retort should be one that does not use water. Third, to avoid crushing and grinding costs, the retort should be able to handle coarse material. Fourth, to save transportation cost, the retorts must be placed at the portal of the oil shale mines at the cliff face high above the valley floor where space for plant structures is costly, therefore, the retort must have a high throughput per unit area. These four criteria,

to date, are satisfied only by the Union and the USBM gas combustion retort.

The Union retort consists of a vertical conico-cylindrical vessel into which the oil shale is fed mechanically and continuously from the bottom. The cold incoming oil shale passes up through the retort, gradually being warmed, until it reached the retorting zone where the temperatures are 950° F. There the solid organic matter is decomposed. Carbon residue remains with the rock, the gaseous components join the gas stream in the retort. As the oil shale is forced higher in the retort the temperature is increased, and several feet below the top of the retort, the oil shale reaches the combustion zone where the carbon residue remaining on the rock is burned off. As the rock, now called spent shale, is pushed still higher in the retort it is cooled very rapidly by the incoming air and discharged over the top of the retort at a relatively low temperature. The oil shale comes in cold and goes out of the retort at a relatively low temperature.

The gas stream flows countercurrent to the rock stream. Air is drawn into the top of the retort, becomes heated as it cools the outgoing oil shale, ignites with the carbon residue left on the rock in the combustion zone, and reaches a temperature of about 2000° F. As the air continues down through the retort, it cools as it loses heat to the rising rock and by the time it reaches the retorting zone is at the retorting temperature, roughly 900° F. There the products of combustion, formed in the combustion zone, are joined by the products of distillation of the solid organic matter. The combined gases travel downward



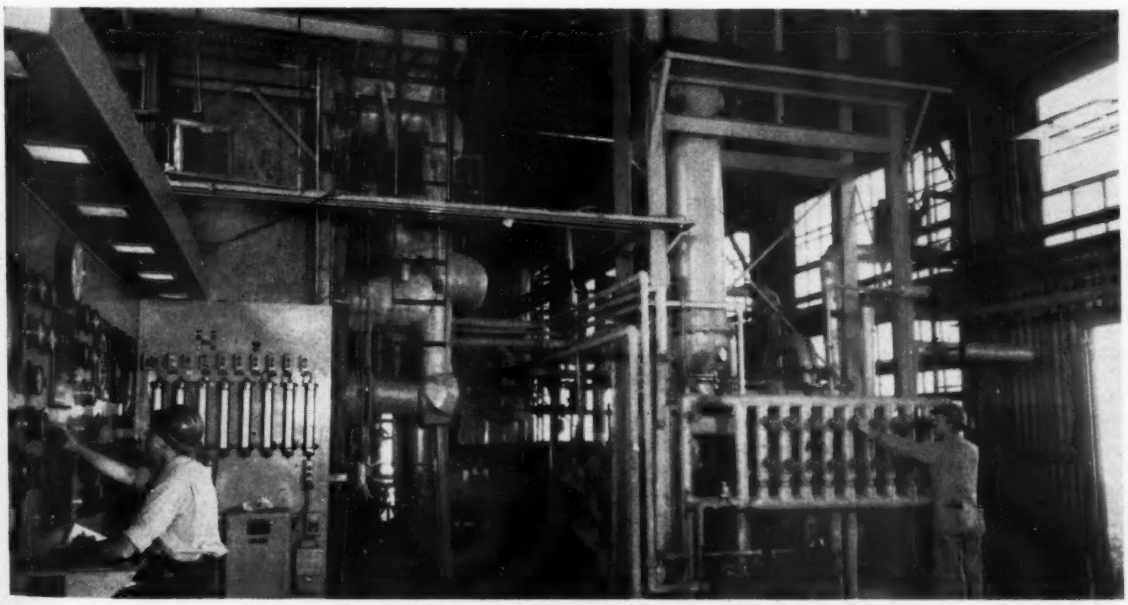
Gas combustion retort vessel

and are cooled by the incoming oil shale. Toward the bottom of the retort the condensable gases are condensed to shale oil. The bottom of the retort and all of the charging mechanism then is filled with shale oil, which serves as a fine lubricant for the machinery and for the oil shale which is pushed upward through the retort. The shale oil flows out of the retort, through the same pipe through which the gases are drawn. The gases which entered the retort at atmospheric temperatures leave the retort at substantially atmospheric temperatures. The oil shale has been retorted with almost perfect heat exchange and the shale oil has been condensed on cold incoming oil shale rather than with water. The entire process is continuous, uses no water, has a high capacity per unit area, and is efficient.

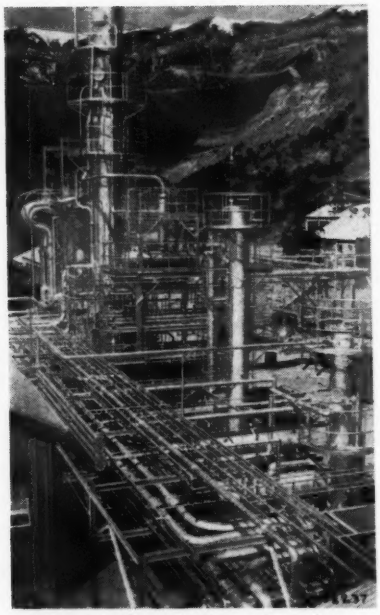
The USBM gas combustion retort operates on a similar principle, except that the cold oil shale is fed by gravity from the top of the retort through to the bottom. The gases containing the products of decomposition of the organic matter in the oil shale are drawn upward and the condensable gases condensed on the cold incoming oil shale as a mist towards the top of the retort. The mist is drawn off and agglomerated in multiclones. The heat for the retorting is supplied in part by the burning of the residual carbon left on the oil shale and in part by the combustion of the noncondensable retort gases.

Have High Efficiency

The Union retort has been tested at rates up to 50 tpd, whereas, the USBM retort has been tested at rates up to 200 tpd and both have yielded when operating under optimum conditions 90 to 100 percent of the assay value of the oil shale. Neither of these retorts are of commercial size. The minimum commercial size retort probably would have to handle at least 1000 tpd and preferably several thousand for optimum costs. Before a commercial oil shale operation can be built, exhaustive tests of these two fine retorts, in sizes able to handle



Gas-flow pilot plant is source of engineering data on retorting of oil-shale



Shale-oil refining includes thermal processing, coking, viscosity breaking and recycle craking

the thousand or more tons per day, will have to be made.

Products of these two retorts are shale oil, which contains two-thirds of the heating value and an 80-85 Btu per cu ft gas, which contains the other third of the heating value. The oil is a 20-21° API gravity oil, which freezes at 90°F and contains much combined oxygen, nitrogen and sulfur. It is not similar to crude petroleum. The low Btu gas, though combustible, cannot be economically transported.

Refining Methods

Two methods of refining shale oil are now being discussed as feasible. The first of these is the conventional method, which has been tested by the USBM at a 200-bbl a day rate. The method includes thermal processing, coking, viscosity breaking, and recycle cracking. It has been shown that a viscosity breaking operation may be followed by recycle cracking of the combined liquid product to obtain about the same gasoline yield as that achieved by recycle cracking of the crude. The naphtha must be heavily treated, to remove the undesirable tar acids and tar bases, to yield a low octane rating gasoline.

Second of the two methods is the one accepted as the most desirable by the National Petroleum Council Committee on Synthetic Fuels Production Costs. In this method, raw shale oil is first subjected to a coking operation to obtain material suitable for further processing. This step must be done close to the retorting site in the Colorado oil shale area. Overhead material from the coking operation, which is known as coker distillate, is split into a naphtha and a gas oil fraction. Coke obtained in the coking operation is a marketable product. A marketable high Btu fuel gas is also obtained as a by-product. Naphtha and gas oil fractions from the coking operation contain nitrogen compounds that impart a disagreeable odor and offer difficulties in further refining operation. The naphtha fraction is catalytically reformed which removes nitrogen as ammonia, hydrogenates the more unstable compounds, and gives a desirable increase in the octane number. The gas oil fraction is subjected to mild hydrogenation which removes nitrogen by conversion to ammonia and, at the same time, upgrades the gas oil by making it more saturated. Ammonia is recovered as a valuable by-product. The sulphur present in the shale oil fractions is converted to hydrogen sulfide which is recovered, converted into sulphur, and sold as such.

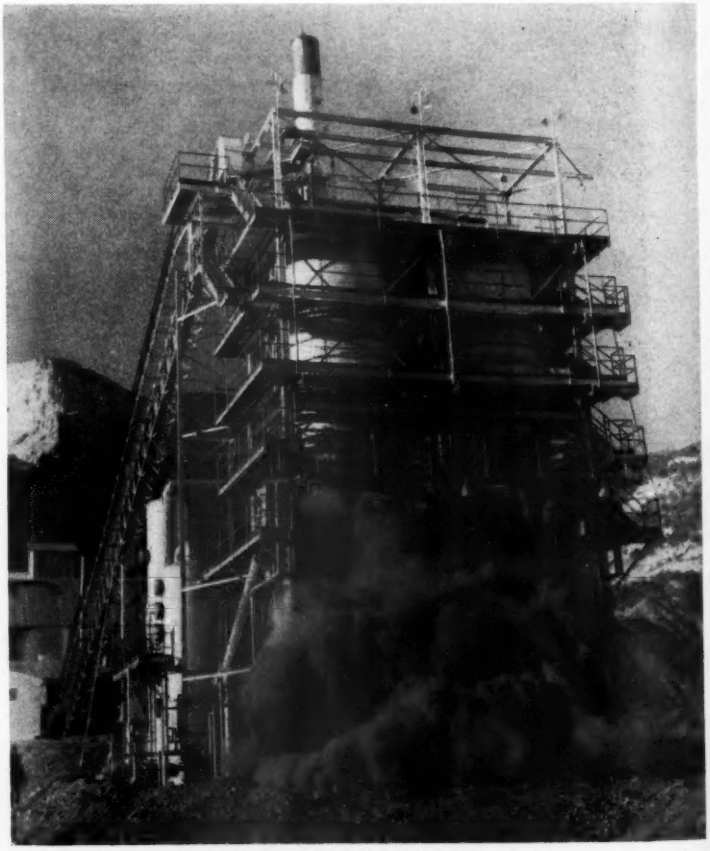
The hydrogenated naphtha and gas oil fractions are equivalent to very high grade light crude petroleums and can be considered a premium refining stock. They can be refined in conventional refineries, and probably would be shipped from Western Colorado to the Los Angeles or Upper Mississippi Valley Area for completion to finished high grade gasolines and diesel fuels. The processes for catalytic reforming and mild hydrogenation were developed by the Union Oil Co. of California and have been well demonstrated on a pilot plant scale, both by Union Oil Co. and the Bureau of Mines.

Economics Encouraging

The National Petroleum Council Study was a thorough one that enlisted the services of hundreds of oil industry engineers. The study showed that a plant of 250,000 bbl a day size would yield the following products:

Motor gasoline	127,000 bbl per day
Diesel fuel	62,000 bbl per day
Residual fuel oil	3,000 bbl per day
Liquified petroleum gases	9,000 bbl per day
Ammonia	460 tpd
Sulphur	215 tpd
Coke	6,000 tpd
Fuel gas	125,000 mscf per day of 100 Btu per scf

All costs used in the study were based on January 1, 1951 figures. It showed that a 250,000 bbl a day oil shale plant will require an investment of $1,400,000,000. The daily operating depreciating and maintenance cost would be $650,000, six percent return on invest-



Spent shale is discharged from the retort

ment would be $230,000, a 50 percent Federal Income Tax would cost an additional $230,000, to total $1,110,000. To break even, the gasoline produced would have to be sold for 14.1 cents per gal. These figures include all Colorado costs, a pipeline to the refining centers, and the cost of finishing the products at the centers. The present price of gasoline at these centers is roughly one cent a gallon lower than that estimated for the price of shale oil gasoline.

The Bureau of Mines, using the more conventional approach to the production of gasoline, also has reached the conclusion that the cost of finished gasoline delivered in present refining centers compares with the refinery price of gasoline made from petroleum.

Most gasoline is made from crude oil from oil fields where finding costs were very low, probably in the order of 10 to 25 cents per barrel. Present finding costs are much greater, perhaps close to $1 per barrel, and the cost trend of finding net petroleum is upwards. Therefore, it probably is not unreasonable to conclude that the present cost of gasoline made from petroleum obtained from recently discovered fields actually is more than the cost which would be incurred in producing it from oil shale.

Remaining Problems

Reasons why no commercial operations presently are being contemplated, despite the fact that oil shale is probably a cheaper source of gasoline than newly discovered petroleum, are numerous. The technology of producing gasoline from oil shale is not completely proved. Mining technology has been demonstrated on a unit commercial scale, but the retorting methods are still on a pilot plant scale as are the refining methods. The outlay of a billion dollars for a commercial oil shale plant without first having proved the retorting and refining methods on a unit commercial scale would be unwise, except in time of dire national emergency.

The next step in the oil shale industry, therefore, is the proving of the retorting and refining steps on a unit commercial scale. The cost of such a step is variously estimated at from $5,000,000 to $50,000,000, and can under no conceivable circumstances be operated profitably. However, the construction and operation of the unit scale plant would result in very rapid improvements in oil shale technology and would yield accurate cost data.

Until 1947 the United States was completely self-sufficient in petroleum. Since then, the amount of petroleum and petroleum products imported have exceeded those exported, and, at the present time, the United States imports over a million barrels a day, or 12 percent of its total demand. Because of flush foreign production, it is cheaper to import some oil than to produce all petroleum requirements in the United States. The importation of foreign oil undoubtedly results in a less rapid rate of finding of new oil resources in the United States. Imported oil also acts as a ceiling on the price of domestic petroleum. Nevertheless, the production of domestic petroleum still is vast, over 6,000,000 bbl a day, and, as the old fields are depleted a larger percentage of our domestic petroleum will be coming from new fields. Because new petroleum is more costly, petroleum prices in the future will be higher. At some time in the near future the petroleum industry will realize that new gasoline can be produced more cheaply from oil shale than from new petroleum. The first commercial plant will be built and the profitability of an oil shale operation will be demonstrated. The rate of production of shale oil then will be limited only by the market, and inexpensive high-grade liquid fuels from oil shale will become part of our economic structure.

Konnerth Mining Machine

(Continued from page 23)

able, such as the entry and cross cut. This permits the Konnerth machine to be working in one place while roof bolting, drilling and shooting are being completed in the adjacent place.

A wing and pocket system is used to totally extract the square blocks which were developed on 85-ft centers. The pockets are driven 16 ft wide across the blocks, using the face cycle previously described. When the pocket is cut through at the back of the block, the five-ft thick wing is mined on the way out. Break row posts are used for temporary roof support while the coal is being mined from the wing. No attempt is made to trip the posts or recover them from the fall area.

Maintenance Well Organized

Maintenance of the miners at Karen is subdivided into three classifications, based on frequency of the work done and the location where the work takes place.

First Echelon Maintenance is done in the section during the two, four-hr idle periods between producing shifts. The machines are completely serviced and minor repairs and needed adjustments reported by the operators are made. To insure that this work can be completed, the shifts of the repairmen are overlapped to provide double strength crews during the four-hr idle period.

Second Echelon Maintenance is done periodically or when necessary on the spare machines during the working shifts. This work usually takes place in the inside repair barn. Unit assemblies such as clutches, conveyors, bars, etc., are replaced and sent to the outside shop to be rebuilt for future use.

Third Echelon Maintenance is done yearly on each machine. One machine at a time is taken out of service and sent to the outside shop and completely disassembled and examined. All worn parts are repaired or replaced as the machine is reassembled.

Summary

In summing up, some of the advantageous features of the Konnerth Miner at Karen mine are:

(1) The Konnerth Miner enables utilization of a repetitious face cycle which provides maximum safety for the four men on the crew. The operator never has to go beyond the last row of roof bolts installed. Dual controls permit the machine to be operated from the side which offers the greatest protection. Small crews reduce the man hour exposure to danger. With one assistant mine foreman provided for each two operating units, and the concentration of the work effort limited to two active working places, accident potentials from unsafe practices or conditions are more readily observed and corrected.

(2) The machine is adaptable to any of the present day mining systems for use on development as well as rib extraction because of its maneuverability, size and weight.

(3) A minimum amount of dust is put into suspension. (This is controlled by four low pressure water sprays.)

(4) Because the machine is designed to load from the mine floor, it can maintain clean working places.

(5) If size of coal produced is a factor to be considered as an advantage, only eight percent of the coal is cut to bug dust with the bits.

(6) Speed of extraction in each individual working place and concentration of production from a limited area tend to prevent deterioration of physical conditions.

(7) The face cycle, as adapted, lends itself to attaining the maximum results from roof bolting by exposing the minimum amount of roof area and providing roof support in that area with the minimum time interval.

(8) It has enabled high tons per man at the face and tons per man on the payroll production, and, incidentally at a unit cost that will withstand the toughest competition on the open market.

The Westmoreland Story

The Larimer mine was the first coal producer for the company

Oldest Bituminous Coal Mining Company in Continuous Operation Celebrates 100th Anniversary

By GEORGE W. SALL

SIX years after gold was found at Sutters Creek in California and five years before Colonel Drake put down the first oil well at Titusville, Pa., the Westmoreland Coal Co. was formed with coal properties in Westmoreland County, Pa. That was in 1854, the year the Pennsylvania Railroad completed its famous "Horseshoe Curve" and opened the way for through trains from Pittsburgh to Philadelphia. Coal was burned in fireplaces and stoves but was secondary to wood as a fuel for heating.

Westmoreland County is in Southwestern Pennsylvania. George Washington was one of the first to explore the area, when in 1753 he was sent by Governor Dinwiddie of Virginia to survey the general territory, there being some conflict between the colonies of Virginia and Pennsylvania as to which held title to the area. This dispute was resolved in the favor of Pennsylvania and in 1769 the lands of the western part of the state were opened to purchase. Underlying part of the area is the Irwin Basin of the Pittsburgh Coal Seam. The basin is geologically known as the Lisbon Synclinal and is famous for its gas coal.

Although coal had been discovered there before 1769, no attempt was made to mine it commercially until 1853. In 1852, the Pennsylvania Railroad completed laying track from Pittsburgh to the vicinity of what is now Irwin, Pa., about 21 miles east of Pittsburgh, as part of its program to connect Pittsburgh with Philadelphia by rail. The following year Thomas Scott and William Coleman opened the Oak Grove mine, later called the Old North Side mine, and gained the honor of being the first to tap the rich Irwin coal basin. Scott later joined the Pennsylvania Railroad and became its president.

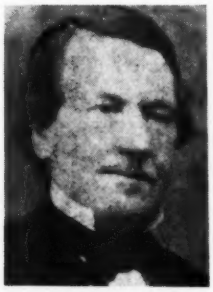
Need for Coal Was Growing

By mid-1800, the use of illuminating gas had come into its own in Europe and was being adopted in this country. Baltimore had led the way when it granted a franchise for a gas light company in 1816. Burning gas for illumination in this country, however, was regarded with fear by many people and it was not until 1865 that the practice began to make any great progress. By 1854, then, the market for gas coal was growing and men of vision could see a rapid expansion for its use in the not too distant future.

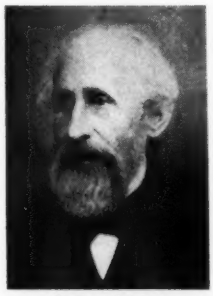
With the completion of the Pennsylvania Railroad from Pittsburgh to

In 1854 this 12½-bushel cart might have been called the latest in underground transportation

Westmoreland's Presidents

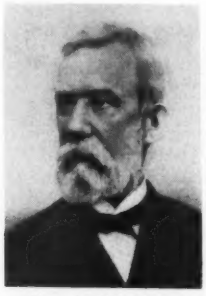


John Covode
1854-1856

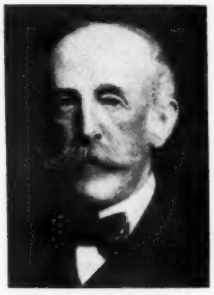


James Magee
1856-1857

Edward C. Biddle
1857-1884



Francis H. Jackson
1884-1888



E. H. McCullough
1888-1910

S. Pemberton Hutchinson
1910-1929

E. B. Leisenring
1929-1951

Ralph H. Knode
1951-

Philadelphia, the problem of moving coal from western Pennsylvania to the East Coast was solved. The time was certainly ripe, and on July 7, 1854, the Westmoreland Coal Co. was formed to produce coal for sale to gas light companies in the East.

Five Men and a Vision

General William Larimer, Herman Houpt, John Covode, John Scott and James Magee were the company founders and Covode was named president. Covode was an attorney in Westmoreland County and like many of his profession was interested in developing the resources of the young country. Houpt was chief engineer for the Pennsylvania Railroad and as such had the responsibility of connecting Philadelphia to Pittsburgh with rail. The money to finance the undertaking was raised in Philadelphia. By 1856 there were 55 stockholders in the company and as the company closed its first 100 years of operation there were 1,025 stockholders on the books.

Westmoreland Coal Co. opened Larimer Colliery No. 1 at Irwin, Pa. The land was covered with dense forests then, and dressed beef was selling at $4.00 per hundred weight. There were 11 houses and one church in the town of Irwin which had been laid out the year before. Confident, indeed, must have been the men who ventured into the coal mining business at that time.

The Larimer Colliery was a "cart mine" in its early days. Coal was mined with pick, wedge and hammer, then loaded into two-wheel carts which held about 12½ bushels. Miners were required to mine the coal, load the carts and push them to the outside and dump the coal on loading platforms along the railroad siding. The coal was then shoveled into railroad cars. For this stint, the going rate, in 1854, was 31¼ cents per ton or 1¼ cents per bushel of coal delivered at the siding. Dogs were sometimes used to assist in moving the carts out of the mine.

Mine cars traveling on track were also used and it is not now clear why carts were used at all. However, pit carts were used extensively and a company inventory, dated 1858, lists 74 of them as being on hand.

Expanded in 1856

Shortly after the Larimer Mine opened, there was a period of activity in property transactions and in 1856 the Westmoreland Coal Co. acquired the Oak Grove mine from Scott and Coleman. In the same year it purchased the Spring Hill mine near Pit-

A retail yard at the turn of the century. Westmoreland's South Side mine, 1899

cairn, Pa. Production of the company was 112,000 tons of coal.

The Oak Grove mine not only produced coal, but served as a subway of sorts for awhile. Residents of Scotch Hill, where there was an opening, would ride the mine cars underground, through the hill, to attend church in nearby Irwin.

In the annual report of the Board of Directors for 1857 it was reported that 150 yards of track had been put down at the Larimer mine using 55-lb T-rail. In the same year, the company president's salary was established at $2500 per year.

As already mentioned, the primary market for the company's early production was gas works along the eastern seaboard. The minutes of the meeting of the board of directors for January 6, 1858, reports: "In 1856, 22 gas companies were supplied by us with coal. This year deliveries have been made to 37—reaching as far east as the state of Maine, south to Georgia and the interior of Massachusetts by rail from New Haven." New customers were attracted, and ten years later, 90 gas works were purchasing coal from the Westmoreland Coal Co.

Everything was not rosy, however, as can be seen from the following extract from the report of the annual meeting held in 1858. "Imports (of gas coal) in 1858 were 50 percent greater than in 1857 and it could be bought cheaper in New York than Westmoreland coal."

Transportation Problems

Then, too, during its early life the coal company was plagued with railroad car shortages. As early as 1859 the company's profits were affected by this car shortage. In a report of that year this statement was made: "The directors of the coal company estimated that in 1859 profits were $6000-$7000 less than they could have been because of the lack of cars." Upon the urging of the coal company, the Pennsylvania ordered 400 additional eight-wheel trucks and boxcars.

Westmoreland had purchased 24 railroad cars of its own in which to ship coal in 1855. Other cars were acquired when the Oak Hill Mine was purchased and an inventory of 1859 lists as company property 58 five-ton coal cars. These four-wheel cars caused many accidents because of the tendency of trains in which they were pulled to buckel.

With the onset of the Civil War, transportation on the railroad went from bad to worse, and in 1861, 200 eight-wheel coal cars with a capacity of 11¼ tons apiece were purchased by the company at a cost of $413.44 each. The problem was still not solved, however, because engines and rolling stock were being diverted to move troops and supplies for the Union Army. The Westmoreland Coal Co. had to go so far as to arrange with the Reading Railroad to furnish three locomotives and 300 cars to haul coal over the Pennsylvania system in order to meet a contract deadline in 1861.

Actions of the Southern Army continued to affect transportation on the Pennsylvania Railroad. In 1861 the interruption of traffic over the Baltimore and Ohio Railroad caused "serious embarrassment to our business" because of the increased traffic on the Pennsylvania. Then, in 1863, coal company directors reported, "Transportation was interrupted for two weeks by the invasion of our state by the Southern Army in June."

In 1864 the railroad informed the coal company that too many accidents were being caused by the four-wheel cars and the railroad would refuse to pull them in the future. This sounded the death knell for such cars and they were disposed of.

Studied Mechanization Early

The Westmoreland Coal Co. studied the possibilities of mechanizing certain mining operations early in its existence. The following statement is taken from a report made in 1865. "... directors are watching with interest the efforts to introduce coal cutting machines to the mining operations of this country." They hoped, "we may soon have coal cutting machines successfully at work at our mines." In 1866 they contracted with the owners of the patent on the Greiv and Boyd Coal Cutter to use the machine on a royalty basis. This experiment was not fruitful, though, and the use of the machine was discontinued in May 1867 because of its imperfections.

Much of the coal of that era reached its final destination by water shipment. In 1866 the Pennsylvania Railroad completed the extension of its line to the Ohio river and the Westmoreland Coal Co. rented a wharf at Greenwich. They then entered the shipping business and on May 15, 1867, the *Westmoreland* was launched. This sailing vessel had a length of 110 ft, a width of 29 ft and drew nine ft. Its capacity was 400 tons. Much of the company's coal is still shipped by water to markets all over the world but it has long since disposed of its coal carrying vessels.

Another coal producer, the Foster Coal & Iron Co., was absorbed in 1870 and 379,189 tons of coal were produced. The following year the Westmoreland mansion was built for officials and directors' use at Irwin. This landmark still stands.

In the "good old days" the portal had to be opened by pick and shovel. Here coal company directors inspect progress in the opening of a new mine

By now, the iron and steel industry around Pittsburgh was developing rapidly and in 1871 Carnegie and Co. contracted with Westmoreland to take unscreened slack to use in its coke ovens. This was of great advantage to the coal company as slack was a problem to dispose of.

The mine manager of the late nineteenth century had his cost problems too, as the following letter indicates:

August 16, 1872

W. D. Woodruff, Esq.
Pres., Gas Light Co.
Bridgeton, N. J.

DEAR SIR:

We have yielded to the demands of our miners for an increase of wages and have therefore advanced the price of our coal twenty-five cents per ton.

Yours truly,

M. T. JACKSON
Treasurer

Incidentally, Westmoreland Coal Co. started shipping to the Bridgeton Gas Light Co. in 1857 and continued shipments of coal to that company until 1950 when the manufacture of artifical gas from coal was discontinued. That must set some sort of record as far as customer relations are concerned — 93 consecutive years of a mutually satisfactory business arrangement.

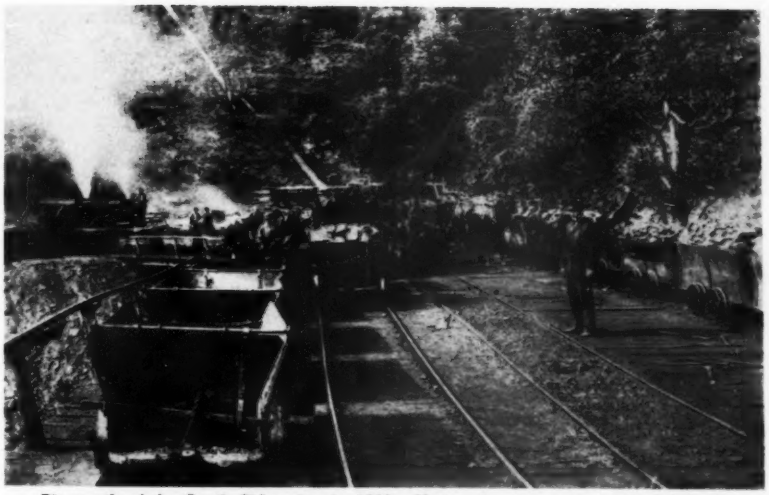
The Westmoreland - Youghiogheny Coal Co. was taken over in 1872 and two years later the company absorbed the Philadelphia and Youghiogheny Coal Co.

Haulage Developments

Power for transportation in the first years of Westmoreland Coal Co's life was furnished by men, dogs, ponies and mules. However, the company was continually searching for ways to save time and effort in mining coal and a report of 1873 lists the purchase of a mine locomotive. A later report described a mine locomotive in use at the company's South Side colliery which hauled coal from the dip workings. It weighed seven tons and outperformed 20 mules. Although the report doesn't say, the locomotive must have been steam driven as this statement was made, "There is a separate split of the air current for the locomotive road and none of the smoke ever enters where the miners work. . . . About 40,000 cfm of air are circulated through the haulage entry."

Undoubtedly the early mines were ventilated by natural ventilation. It is not known exactly when furnaces were first used to ventilate Westmoreland Co. mines but in 1874 the South Side Furnace was listed among company holdings.

From the minutes of the 1877 meeting of the Board of Directors it is learned that the "Molly Maguires" were active and were inciting trouble among "our miners." Three years later the Shafton Coal Co. was taken over.



Pit mouth of the South Side mine in 1890. Notice the steam engine in left background. This might well have been the mine locomotive referred to in the text

Although earlier attempts at cutting coal mechanically failed, in 1882, the company contracted to install Harrison cutting machines. Eight were at work by the year's end and 20 were being operated by 1886. This was a puncher type machine, similar to the jackhammer of today, but the compressed air pistons were square and could not turn. Daily average stint for a machine "runner" was 245 sq ft of "bearing in," but the best "runners" could do as much as 285 sq ft. This was equal to the width of three 21-ft rooms undercut to a depth of between 4½ and 5 ft. The machines could be mounted to "shear" the coal also—that is to break the coal down much as a pick miner did by hand. However, this was not practiced at Westmoreland where the coal was shot.

During 1883, there were 55,503 tons of coal mined with the Harrison machine and in two years, 110,779.92 tons were mined by the coal puncher. One might well wonder who kept such detailed records that coal production was known to the hundredth of a ton.

Competition was tough in the late 1800's as evidenced by the following excerpt from the 1883 report of the Board of Directors: "The very large recent development of bituminous coal territory,—leading to overproduction, undue competition and necessarily very low prices, has, of course, caused us and other mining concerns to receive smaller profits than heretofore." How many times since 1883 could those sentiments have been echoed?

A photograph taken in 1890 shows Zig Bostic operating a Harrison mining machine at Biddle mine

Early Mining Methods

Much about the methods of mining coal in the mid-1800's can be learned from the Geological Survey of Pennsylvania, 1886. In that volume there is a chapter by A. N. Humphrey entitled, "Mining Methods Practiced by Westmoreland Coal Co., Irwin, Penna." Humphrey reported that at Westmoreland Coal Co. properties, the room and pillar method of mining was being used. Double entries were driven on 25-ft centers and 21-ft rooms were turned off these, left and right, on 33-ft centers. Pillars were mined on retreat. He went on to say, "Many mines do not use powder, never having had any experience in its use, but forced the coal loose by wedging. In some of the mines they are not permitted to use powder."

In the same report, Humphrey described a steam engine that Westmoreland used having a 50 by 120-in. cylinder, which was coupled to a 20-in. plunger pump to keep the mine clear of water. The pump could be run as fast as eight strokes per minute without risk of damage and had a capacity of 1300 gpm at that speed. Water has always been a problem in the mines around Irwin and in 1952 the Westmoreland Coal Co. pumped approximately 31 tons of water for every ton of coal produced.

Humphrey reports that in 1886 it had not yet been determined exactly how much coal could be hoisted out of a shaft. This was an important consideration of that day. From the Westmoreland shaft, 200 ft deep, three wagons per minute or 3¾ tpm could be hoisted. This totaled 2250 tons per ten-hour shift, but that theoretical figure had not yet been reached. A 20 by 36-in., first motion steam engine was used to hoist coal.

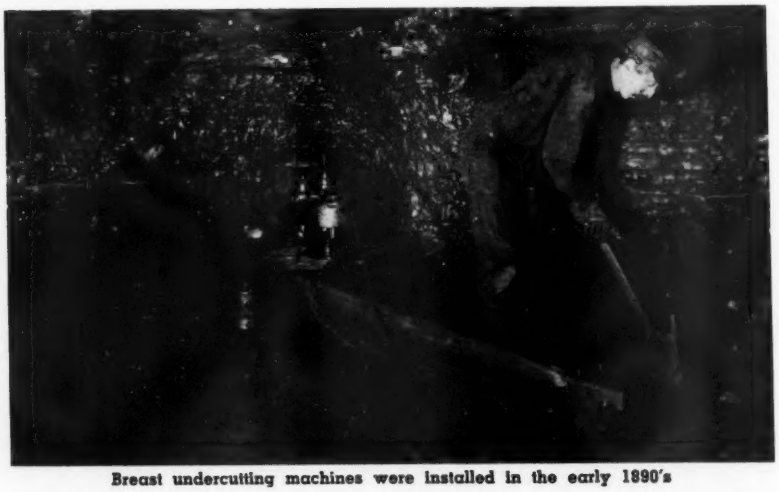
At that time a tail rope haulage system was in use at the Osceola colliery of the company and did the work of nine mules in hauling out 300 tpd on a 2¼-mile round trip haul. Shortly thereafter, wire rope haulage was introduced at Larimer. The system included new features, "introduced for the purpose of decreasing the number of employes required to transfer the coal from the mine to the tipple." It had a capacity of 2500 to 3000 tpd.

By comparison with present day standards, construction costs were certainly cheap in 1886. Humphrey tells about a 12 by 13-ft air shaft being sunk at a cost of $2.12 per cu yd. Timbering was not included but the contractors did furnish "powder, oil and tools."

The coal company owned 1200 railroad cars in 1886; the largest with a capacity of 50,000 lb, and the smallest, 30,000 lb. These cars needed repair at times and for many years Westmoreland operated large and complete railroad car repair shops at Irwin. They passed from the scene during the early 1940's, however, when all rolling stock was disposed of.

Breast undercutting machines were used before 1892 and compressed air locomotives were installed about the same time. At the company's Penn No. 2 mine, two large Ingersoll-Rand compressors on the surface furnished air to the Breast machines and compressed air locomotives. Air at 80 psi was furnished the cutting machines while the locomotives demanded a supply at 1000 psi.

The last furnace ventilated mine, No. 4, was shut down in 1900. The stack stood as a local landmark, however, until 1938 when it was shut down.



Breast undercutting machines were installed in the early 1890's

Coal Cleaning

Coal washing came into the picture in 1907 when a home-made jig was constructed by the coal company to wash their slack coal. This product was sold for use in coke ovens. According to the U. S. Bureau of Mines, only 2.9 percent of the coal production for that year was cleaned mechanically—and part of that by the consumer rather than the producer. Electricity went underground about 1914. At this time, the first shortwall cutting machines were placed in service as were electric mine motors.

Mechanical loading had its first trial at the Westmoreland Co.'s Irwin properties in 1918. A Halby shovel was installed in the fall of that year to load coal. This experiment was short-lived, however, and the machine was abandoned the following year. Again in 1924 mechanical loading was tried using Joe Joy's new machine. This trial convinced the company of the future of mechanical loading and they began to mechanize.

Nineteen eighteen also was the year the company absorbed the Penn Gas Coal Co. and the Manor Gas Coal Co.

Enter West Virginia

Coal property acquisitions of the company were confined to the Irwin coal basin until in 1923 when coal lands in southern West Virginia were purchased by the company. The original West Virginia property was added to in 1924, 1927, and 1928 to round out the company's holdings there. Then in 1949 the company's Hampton Mine was opened near Madison, W. Va.

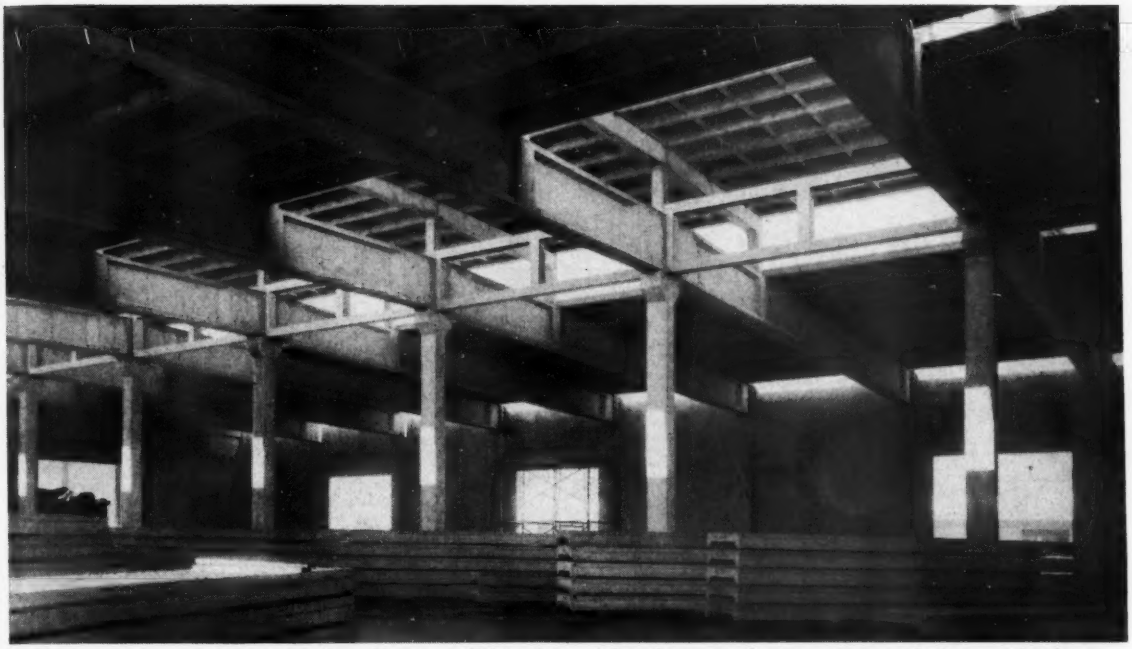
The company was reorganized in 1929. Westmoreland Inc., a Delaware corporation, was formed and took over the Pennsylvania and West Virginia properties. The Westmoreland Coal Co. continues to operate them.

Westmoreland Coal Co. had the singular honor of being selected to furnish coal to the royal train of the King and Queen of England from Niagara Falls to Washington on their historic visit to the United States, June 8, 1939.

Peak year of production was 1913 when 4,794,835 tons were produced. During the 100 years 1854-1953 total tonnage produced was 166,530,683 tons, or an average of 1,665,307 tons per year. However, Westmoreland Coal Co. still has large reserves and many more years to operate in the Irwin Gas Coal Basin of Westmoreland County, Pa. As production tends to decrease in this area it will be more than offset by increased production at the new Hampton Mines in Boone and Logan Counties, W. Va.

Looking Ahead

This then is the story of a coal company as it passes its one hundredth birthday. If there is any truth in the adage "The first hundred years are the hardest," the Westmoreland Coal Co. will march ahead in fine style. The large reserve acreage in West Virginia will insure the company of continuing to be for many, many years to come, the oldest bituminous coal mining company in the United States maintaining a continuous existence.



Prestressed concrete beams are 40 to 50 percent lighter than reinforced concrete beams, cannot crack, increase headroom

Prestressed Concrete—A Fourth Structural Material

During Last Three Years, Use of This Material Has Skyrocketed in U. S.

By EDWARD K. RICE

Partner
T. Y. Lin & Associates
Consulting Engineers
Los Angeles, Calif.

THE fundamental theory of Prestressed Concrete design has been known to engineers for some time, but it has been only recently that both the materials for prestressing and the practical construction know-how have made this new structural "material" as available to industry as wood, steel and reinforced concrete have been.

Development

The basic principle of prestressing was used perhaps centuries ago when wooden or metal bands were wound around wooden staves to form barrels. Tensile prestress was introduced into the bands by tightening them, thus producing a compressive prestress between the staves and enabling them to remain in compression, and thereby leak proof, after the barrel was filled with liquid. In other words, both the bands and the staves were prestressed before they were subjected to service loads.

The same principle, however, was not applied to concrete until about 1886, when P. H. Jackson, a San Francisco engineer, patented methods of tightening steel tie rods in concrete arches to serve as floor slabs. About 1888, C. E. W. Doehring of Germany independently secured a patent for concrete reinforced with metal that had tensile stresses applied to it before the slab was loaded. Since concrete is weak in tension but strong in compression, pretensioning the steel puts compression in the concrete which can be utilized to counterbalance any tensile force created by dead or live loads.

These first patented methods were not successful because the low prestress then produced with regular strength steels was soon lost as a result of the shrinkage and creep of concrete. When an ordinary structural steel bar, modulus of elasticity 30,000,000 psi, is prestressed to 18,000 psi, the unit elongation is 0.0006 in. per in., which is about the same as the eventual shrinkage and creep of the concrete and, therefore, the prestressing force is lost.

In 1908, C. R. Steiner of the United States proposed the possibility of retightening the reinforcing rods after some shrinkage and creep of concrete had taken place in order to recover some of the lost prestressing force. In 1925, R. E. Dill of Alexandria, Nebr. tried high strength steel coated with tar to prevent bond with concrete. After the concrete had set, the steel rods were tensioned and anchored to the concrete by means of nuts. Neither of these methods was applied to any extent.

Modern development of prestressed concrete started with E. Freyssinet of France, when in 1928 he developed the use of high strength steel wires for prestressing. When high strength wires with an ultimate strength of as

high as 250,000 psi and a yield point of approximately 180,000 psi, are stressed to 150,000 psi, the unit strain is 0.005 in. per in. Assuming a total shortening of 0.0007 in. per in. due to the shrinkage of concrete and creep of both concrete and steel, a net strain of 0.0043 in. per in. still remains in the wires, which is equivalent to a prestressing force of 129,000 psi.

Although Freyssinet also tried the scheme of pre-tensioning where the steel was bonded to the concrete without end anchorage, practical application of this method was generally credited to E. Hoyer of Germany. The Hoyer system consists of stretching wires between two buttresses several hundred feet apart, putting forms between the units, placing the concrete and cutting the wires after the concrete has hardened. This method enables several units to be cast between two buttresses.

Pretensioned, prestressed, concrete panels can be cast, cured and stockpiled until needed

New Techniques Needed

Wide application of prestressed concrete was not possible until cheap and reliable methods of tensioning and end anchorage were invented. In 1939, Freyssinet developed conical wedges for end anchorage and invented double-acting jacks which tensioned the wires and then anchored them. In 1940, Prof. G. Magnel of Belgium developed the Magnel system, wherein two wires were stretched at a time and anchored with a simple wedge at the ends. Since that time, prestressed concrete began to grow, but it did not actually gain momentum until about 1945. Perhaps the shortage of steel in Europe had given it some impetus, since much less steel is needed for prestressed than for reinforced concrete. But it must also be realized that time was needed to prove the serviceability, economy and safety of the method as well as to acquaint engineers and contractors with a new method of design and construction.

While France and Belgium may have led the development of prestressed concrete, other countries in Europe such as England, Germany, Switzerland, Sweden and Denmark, also followed the path and applied the method in varying degree.

Prestressed concrete in this country took a different course of development. Instead of linear prestressing, a name given to prestressed concrete beams and girders, circular prestressing especially as applied to storage tanks took the lead. This was credited almost entirely to the Preload Co., which developed a special wire winding machine for the tanks, and, which from 1935 to date, has built more than 600 prestressed concrete tanks throughout this country and in other parts of the world.

Linear prestressing did not start on any appreciable scale in this country until 1949 when construction was begun on the famed Philadelphia Walnut Lane Bridge. The first prestressed concrete bridge in this country, however, was completed in October 1950, in Madison County, Tenn., though it was a much smaller structure than the Philadelphia bridge. In the middle of 1951 it was estimated that 175 bridges and 50 buildings had been constructed in Europe incorporating prestressed concrete. At that time, no more than ten such structures could be found in this country. At the end of last year (1953) it was estimated that over 1000 linear prestressed concrete structures were either completed or under construction in this country. These figures indicate the rapid progress now being made in the design and construction of prestressed concrete structures in the United States.

Cored life slab construction is used when span exceeds 25 ft or for heavy floor loads

Prestressed vs. Reinforced Concrete

Structural elements of prestressed concrete such as beams, slabs and walls are in some respects similar to reinforced concrete; however, prestressed concrete has the following advantages over reinforced concrete:

(1) *Reduction in dead load of the member.* A prestressed concrete beam is approximately 40 to 50 percent lighter than a reinforced concrete beam of the same load carrying capacity and span, thereby reducing both the quantity of concrete required to construct the beam and the dead load of the structure.

(2) *Control of deflections.* Prestressed concrete is probably the only structural material in which the deflection of a member can be readily controlled. Wood, steel and reinforced concrete all show deflection under dead load; prestressed concrete

can be designed to show no deflection under any given loading condition. Modern architecture with its long cantilevers and thin sections requires increasing control of deflections. Prestressed concrete can economically provide this control.

(3) *Crack free concrete.* Since every element in a prestressed concrete member is under compression there can be no structural cracks. For structures exposed to corrosive climates the crack free concrete provides excellent protection for the reinforcement. In the case of concrete tanks, prestressing makes them leak proof.

(4) *Greater elasticity.* Prestressed concrete displays almost phenomenal ability to return to its original shape after being deformed by over-loading. This factor allows precast prestressed elements such as beams, tilt-up wall panels, and lift slabs to be erected with less danger of failure due to overstressing during erection.

(5) *Increased head room.* The depth of prestressed concrete beams and slabs is approximately 30 percent less than an equivalent reinforced concrete beam or slab, thereby either increasing the head room in the building or decreasing the total height. A 20-story parking garage first designed in reinforced concrete beam and slab construction was redesigned in prestressed slab construction and the total height of the building was reduced 19 ft!

Lift Slab Construction

Lift slab construction consists basically of placing the concrete for the upper floors and roof of a building at the ground level in their relative positions in the building, and then mechanically lifting them to proper elevations and at these points permanently fastening them to the columns. This scheme of building reduces the cost of construction by eliminating most of the form work, eliminating the elevation of the concrete, and shortening the total construction time. By prestressing the slabs, longer spans between columns can be achieved, deflections can be controlled, and since the prestressed slabs are quite elastic and will stand considerable warping during lifting, less expensive lifting equipment can be used for prestressed slabs than is used for regular reinforced slabs.

Credit is due Vernon Welborn, architect, of Las Vegas, Nev., for the early development of inexpensive lifting equipment for prestressed lift slabs.

Prestressed lift slab construction has been economically used for office buildings, schools, apartments, dormitories and multi-storied warehouses.

Six in. thick solid slabs are economical for buildings with bays up to approximately 25 by 25 ft. The six-in. solid slab offers the following advantages over other structural systems:

Finished concrete floor.
Flat ceiling.
Reduction in noise between floors.
Reduced story height.
Thermal insulation.
Fireproof construction.

Cored slabs are used when the span exceeds 25 ft or the floor loading is high. By coring the slabs the effective depth of the slab is increased without increasing the dead load, and spans of 60 ft are economical.

Prestressed concrete has been used for fence posts, storage tanks, telephone poles, railroad ties, and other purposes

In the case of roof slabs it is often economical to place inverted hollow box beams on top of the slab. The roof for a gymnasium of 110-ft clear span was recently designed using a six-in. slab with inverted beams on 23-ft centers.

The in-place cost of prestressed concrete lift slabs is dependent upon the layout of the columns and the loading to be imposed on the slab. Generally, column layouts of uniform interior spans with overhangs of approximately 35 percent of the interior spans are the most economical.

The cost breakdown for the six-in. thick prestressed lift slabs for the Soly Apartment Building is:

	Cost per sq ft of slab area
Prestressing steel 1.25#/sq ft of slab area @ $0.55/# in place	$0.66
Concrete (compressive strength: 4000 psi) 0.5 cu ft / sq ft of slab @ $20.00/cu yd in place	0.36
Mild steel reinforcement around openings, etc.	0.02
Lifting collars @ $25.00 each	0.09
Lifting and welding	0.11
Total	$1.24

The costs for prestressed lift slabs to date have been from approximately $1.17 per sq ft for a large, six-story hotel to $2.04 per sq ft for a warehouse floor with a live load of 250 lb per sq ft.

One company in Southern California, recognizing that the design and construction of prestressed lift slabs is a specialized operation, now offers a "package deal" including the design and construction of just the slabs for a fixed price, the price being determined in the preliminary design stage of the building. The "package" is becoming very popular with owners, architects and contractors, as it allows them to take advantage of the economies of prestressed lift slab construction without the risk of trying a new method with which they are not familiar.

Concrete Girders and Beams

Prestressed concrete beam and girder construction is now competitive with both steel and wood truss roof systems. Recently a 115,000-sq ft transit shed for the city of San Diego was designed for 66-ft tapered steel beams on 20-ft centers, resting on 40-ft steel girders; however, the specifications allowed for an alternate design in concrete, and the low bid was $299,600 for the prestressed concrete alternate against $318,500 for the steel design. The concrete members offer a further savings in reduced maintenance cost and reduction in fire hazard.

The beams and girders are being

(Continued on page 61)

Here's the COST-CUTTING DRILL

TUNGSTEN—*This driller bottoms holes quickly and easily with the Joy combination in a tungsten mine.*

COPPER—*This driller, in a square set stoping operation can stand safely back from the face while he drills a round with the Joy Air Leg and LM-47.*

COPPER—*This Joy Air Leg and LM-47 Drill make it easy to drill off a drift round in this Arizona copper mine.*

IRON ORE—An adaptation of the Joy Air Leg for drilling soft ores in the Iron Country is this model equipped with the Joy H-37 auger drill. Versatility of the Joy combination is shown here in its use as a stoper, an arrangement made possible by mounting in such a way that the drill and leg may be placed in almost parallel positions.

with "ONE-HAND CONTROL"!

JOY Air Leg and LM-47 Drill

Ever think you'd find an air leg and drill combination that would meet as many cost-cutting and ease-of-handling requirements as this?

1. One-hand feed control built into the backhead—easy to handle.
2. Outdrills any other drill and leg in competitive tests.
3. Has lower maintenance cost than any other drill and leg used in the same mine.
4. Well-balanced for ease of handling and for minimum misalignment of drill and steel.
5. Lightweight and easily assembled, dismantled and moved around the mine.

That's the story of the Joy Air Leg and LM-47 Drill. They're a perfectly matched pair. Write today for complete information. ● ***Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.*** In Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ontario.*

NICKEL—*This driller shows "one-hand" operation of the Joy Air Leg and LM-47 as he drills face holes in a nickel mine.*

IRON ORE—*Face drilling in hard ores is not a tough job at all with these Joy legs and LM-47 drills.*

Consult a Joy Engineer

JOY

WORLD'S LARGEST MANUFACTURER OF UNDERGROUND MINING EQUIPMENT

At the Program Committee meeting hundreds of suggestions were carefully considered and a comprehensive program laid out

Program Committee Meets in Golden State

Shape Program for Big Mining Show in San Francisco

LAST month 38 State and District Chairmen and local committee members answered National Program Chairman Frank R. Milliken's call to meet in San Francisco. At this meeting the framework was determined and filled in for the Convention Sessions at the American Mining Congress 1954 Mining Show, to be held in San Francisco's huge Civic Auditorium September 20-24.

After carefully considering each of the suggestions sent in by nearly 200 committee members and other interested mining men, the committee chose those best calculated to answer the questions uppermost in the minds of metal and nonmetal mining men all over the country.

Among topics to be thoroughly aired at the September meeting will be: progress in Congress of legislation of interest to the mining industry; national mineral policies; labor and personnel relations; public land law amendment; tariffs, stockpiling and mineral exploration programs; mine taxation; gold, silver and monetary policy; the over-all outlook for the minerals industry, and special problems of the strategic metals producers.

Also scheduled for discussion are operating problems in prospecting and exploration, new drilling developments, progress in underground mining, shaft sinking, hoisting and haulage, open pit mining, advances in ore treatment and mineral beneficiation, safety and maintenance. A third series of sessions will be devoted to the fast growing uranium industry, its economic and operating problems on the Colorado Plateau and elsewhere in North America.

To assure full and authoritative coverage of these timely subjects, the program committee is inviting responsible officials of the Federal Government, prominent leaders of industry and experienced operating men to speak on the topics chosen.

The vital interest of these subjects and the calibre of the men who will discuss them insures a series of convention sessions second to none in appeal and value to the entire mining industry.

On Friday, September 24, the Minerals Beneficiation Division of the AIME will hold its Fall Meeting in San Francisco. Its fine program, including morning and afternoon sessions and a luncheon, when coupled with the milling and metallurgy sessions at the Mining Congress meetings on Wednesday and Thursday and the comprehensive displays in the exhibit halls, make a real bargain package for mill men and metallurgists who are planning to attend the Mining Show.

More Exhibits Than Ever

Occupying the entire available area inside the Civic Auditorium plus the full expanse of the street and sidewalks extending over to the Civic Center Plaza, the Exposition will be the biggest to date. Some 150 leading manufacturers have already already contracted for exhibit space and the remaining areas become fewer every day.

In recognition of the value of the exhibits, convention sessions will be arranged to afford mining men the maximum opportunity to study the units on display, and to discuss their problems with the experienced manufacturers' representatives who will be on hand for that purpose.

Full descriptions of the exhibits will appear in the special August Pre-Convention issue of MINING CONGRESS JOURNAL. More than 65,000 sq ft of available exhibit space will hold every kind of mining and milling equipment and supplies. The newest exploration tools, the latest drills, most modern haulage equipment and the ultimate in milling and metallurgical machinery, as well as the interesting displays of all the auxiliary service

items and supplies mining men need to get the longest life and most use from their tools with the maximum safety will contribute to each convention goer's education.

Indeed the comprehensive array of exhibits in combination with the outstanding convention sessions, constitute an advanced course in how to mine and process the mineral resources of our country. Many progressive mining companies recognize this and send every key operating man it is possible to spare. The practice has paid off in boom times. It will be even more rewarding now when every piece of operating equipment must be run at top efficiency. This is the year, as never before, to send operating personnel to the AMC Mining Show—and San Francisco is the place.

On the Lighter Side

Every mining man—and his lady—look forward to the social functions and entertainment at the AMC Mining Show. This year, as always, they will more than live up to expectations.

The fun will start with a Chuck Wagon Dinner on Monday evening. This will be held in the Palace of Fine Arts of the 1915 World's Fair, the only building big enough to hold the crowd expected. Dinner with a real Western flavor plus dancing and special entertainment washed down with plenty of refreshment promise to make this a bang-up event.

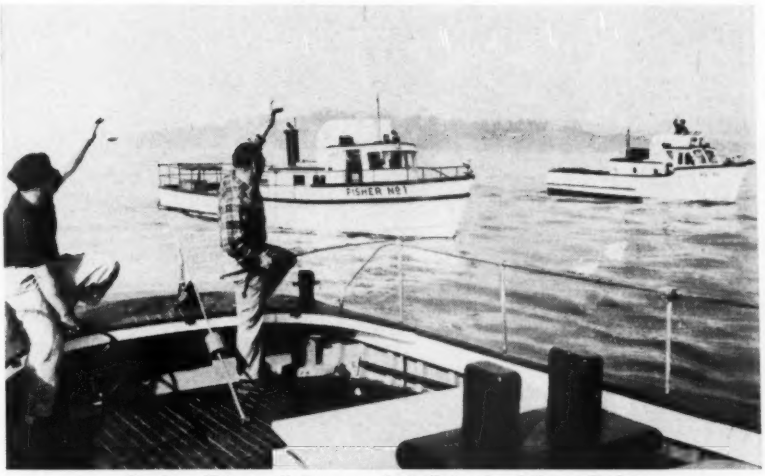
Tuesday evening has been left open for the partying and old fashioned visiting that is such a feature of these conventions.

A special dinner-dance with a top-notch floor show and without speeches is planned for Wednesday evening. This event will occupy all five ballrooms in the historic Palace Hotel. It is a "sure thing" that this event will be the high spot of the week for those who attend.

The San Francisco Opera Association is setting aside a special block of tickets for Thursday evening when the opera will be Lucia di Lammermoor. These tickets and those for all entertainment functions as well as trips should be purchased in advance. They will be forwarded by registered mail well before the meeting. Order early and avoid disappointment.

For the Ladies

A special program of events is being arranged for the ladies. They are, of course, cordially invited to attend all convention sessions and the exposition, as well as the evening social events and trips, but just for them there will be a scenic tour of San Francisco with a reception and tea at the California Palace of the Legion of Honor on Monday afternoon; a trip across the Bay Bridge for lunch at the Claremont Hotel in Berkeley plus some sightseeing in the beautiful East Bay area on Tuesday; special shopping tours of San Francisco's famous stores on Wednesday, and on Thursday a luncheon and style show at the Mark Hopkins Hotel.



Land a "big one" for a real thrill in the Salmon Derby

Trips

Success of the Salmon Derby at Seattle last year prompted the organization of another for the San Francisco meeting. Accordingly a fleet of 32 boats each accommodating 7 to 12 persons comfortably will be ready on Friday, September 24, to carry the fishermen and ladies through the Golden Gate to where the big ones are biting. There will also be a trip to the modern gold dredging operations on the Yuba River and to famous Grass Valley, with lunch at Idaho-Maryland mine, and visits to industrial plants in the San Francisco Bay area.

On Saturday, September 25, many delegates will want to be present at the dedication of the new U. S. Bureau of Mines Precious Metals Experiment Station in Reno, Nev.

September 20-24, 1954, will long be remembered in the annals of American mining as the days of '54 when thousands of mining men descended on San Francisco just as they did in '49. This time they will all find pay dirt in the meeting rooms and expositions halls of the big AMC Mining Show and have a fine time in true mining tradition every evening.

Demand for hotel rooms has been heavy. Those who have not yet done so should not delay asking for reservations. Address the AMC Housing Bureau, care of San Francisco Convention and Visitors Bureau, 61 Grove St., San Francisco 2.

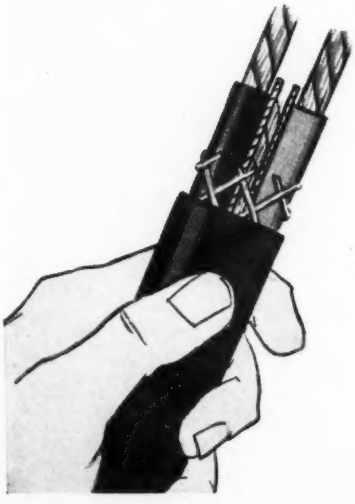
Chuck Wagon Dinner will be held in Palace of Fine Arts on Monday night

"Tell me...how can we stop overloads from cooking our cable?"

"We can't always control overloads on our shuttle car cable. But the damage it does has got to be stopped. It raises blisters... which makes our cable easy to tear. And you know... because of that heat the jacket on the bottom layer of cable on the reel hardens and cracks. That raises hob with cable life! What can we do?"

"You'll put a stop to the trouble if you do this..."

"One of the most important things is to choose a cable with adequate current rating. Your cable or mining machine manufacturer can help you here. You can help avoid trouble *in the mine*, too. When you remove cable for permanent splicing... reverse the ends. And when you are working only a short distance from the power source, remove your cable from the reel and place it where it will be well ventilated. Finally, remember that you generally get what you pay for – one breakdown in a cheap cable costs you *more* than you save by buying on price."



New AnacondA Cables last longer and are safer!

In 15 mines recently surveyed, ANACONDA Cables on shuttle cars are lasting up to 300% longer than cables used only a few years ago. Why? Anaconda cable jackets are made of a new neoprene formula which assures better protection against hard wear. Improved cold rubber insulation has high heat stamina. An improved stranding flexes better under tension. And a new type breaker strip insures better short-circuit protection. It all adds up to *real economy* in use. See your Anaconda Sales Office or distributor. *Anaconda Wire & Cable Company, 25 Broadway, New York 4, New York.* 54339

the right cable for the job

ANACONDA®

WIRE AND CABLE

Illustrate safety precautions with photographs taken on the scene

Visual Aids for the Safety Engineer

Posters, Bulletins and Slides Help Safety Engineer to Put Methods Across

IT is an old saying that one picture is worth a thousand words. Words themselves are remembered longer and more effectively if they are written out for the mind to store as a picture. An old mathematics professor at one time stressed the formula for remembering anything with the slogan, "Think it; write it; read it aloud." Safety engineers all over use at least two-thirds of this formula when they post safety bulletins for the men to see.

Many safety engineers rely on the bulletins obtained from the National Safety Council. These are the most complete line of bulletins available and cover every possible hazard that has been brought to the attention of the Council. These bulletins, placed on bulletin boards all over the country have helped materially to reduce the number and severity of accidents. But mass produced bulletins must of necessity be more or less general in nature. The background, while it is a background and should help illustrate the point that the engineer is trying to put across will sometimes nullify the whole effect of the poster if it does not illustrate a familiar scene.

The mining industry presents some sterling examples of how one can defeat the purpose of the poster by using a wrong background. It would never do, for example, to illustrate the safe method of erecting a timber set for metal miners with a drawing or photograph of coal miners performing the task. To make such a poster really effective, use a metal mining background with miners dressed as bona fide metal miners where the message is to be put across to metal mining men. To go one step further, illustrate the safety message with photographs of men in *your* mine.

Choose Subject With Care

As a sidelight on this procedure, choose as your models, men who are popular with their fellow workers. This practice should be observed, especially where the illustration shows the miner in the act of performing a task in an unsafe manner. If the man thus photographed is not popular with his fellows, they will be more interested in seeing him "caught out" than in the message the poster is trying to put across.

Much has been written on the use of visual aids, such as sound films or lectures illustrated with slides at safety meetings. It is true that such illustrated material is effective, but how much more effective it would be if the film or slides were taken right on the scene in *your* mine showing the safety hazards and machines with which your miners have to deal and showing some of the people who are actually at the

A scoreboard with the elements of competition is a common and effective aid to safety

A poster showing the consequences of an unsafe act gives food for thought

meeting operating the machines in a manner illustrating the points you are trying to put across.

Many safety engineers will feel that the foregoing statement is true, but represents a sort of Utopian dream impossible of fulfillment. Such is not the case. In a number of industrial plants over the country, safety bulletins showing individual operations are illustrated with photographs taken on the scene and slides made in the plant where the safety meeting is being held are used to point up the lectures.

These pictures are taken by the Safety men themselves. They take the pictures, develop them, and put on the program as a matter of routine. Hardly any of them have ever been professional photographers and some had never even developed a roll of film before. But the vast army of amateur photographers who take and develop their own pictures is evidence that no special training is needed to produce effective films.

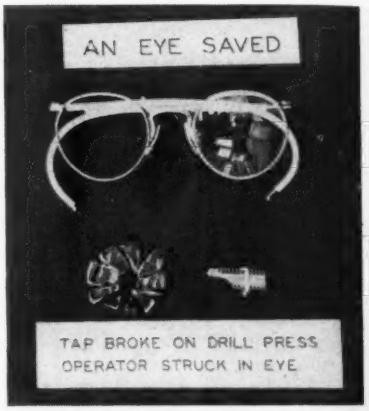
Tools Needed

Standard equipment for taking pictures in the mine or the mill need not be expensive and might include: A 35-mm camera with flash attachment, an enlarger, a projector, a light meter, a print dryer, chemicals, pans, tanks, lenses, etc.

To photograph typewritten material the best film to use is *microfile*. By attaching a plus three and a plus two lens on the camera it is possible to photograph three by five cards, or smaller. A stand to hold the camera is easily built and it should be focused on the card or on the work to be photographed by placing a small piece of ground glass on the open back of the camera with the shutter open by using the "time" stop.

Further use of this type of material is possible at a safety meeting to show the accident experience of each individual foreman on a separate slide and also the accident and frequency rate for the property as a whole. This technique is also useful to illustrate the cause of accidents and to insert slogans or comments between pictorial slides.

To take picture slides the film to use is a *direct positive*. With this type of film the picture is taken in the usual manner but the result when developed is a picture instead of a negative. To make a slide it is only necessary to cut the film and slide the picture into a frame to hold it for insertion into the projector. With this film and the lenses, camera stand, ground glass as used in photographing typewritten material it is possible to prepare slides from photographs and magazine articles.



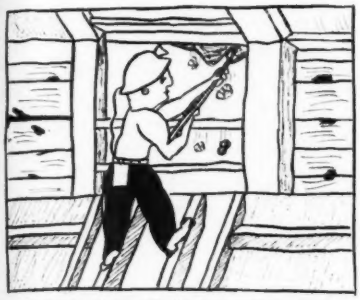
A display board is easily made and very effective

Where the illustration is to be used for pictures that are to be made into bulletins *plus X* film is entirely satisfactory. This film has the same speed as direct positive film and for that reason the light conditions and the camera conditions are the same for both.

A Word of Warning

Instructions for developing film come with each type. All that is necessary is to follow directions. A few warnings in taking pictures might help to avoid some mistakes. Lean toward a smaller lens opening when in doubt in taking surface pictures. The ordinary box camera has a shutter speed of 1/50 of a second and a lens opening of about f16. A glance at some of the excellent pictures taken with these cameras will illustrate the wisdom of using the smaller lens opening. In taking underground pictures remember that there is no possibility of anything but artificial light and govern the lens opening accordingly. A good point to remember is *always believe your light meter.*

National Safety Council can supply a wide variety of posters covering many types of accidents



Don't stand on grizzly bars. Home-made art is crude but tells story

Where you have a good subject, take two or three pictures and, varying the iens opening with each picture. A professional photographer might get away with one exposure but it may be difficult to arrange for the particular set of conditions you are trying to photograph on another occasion so don't take a chance on the "big one getting away." A picture should be taken as close up as practical but remember that you want to get in as much of the familiar background as possible.

After having taken a picture be sure to adjust the camera so that it will be ready for the next one. Don't take chances on double exposures.

In developing film, be sure to watch your temperatures. A thermometer is an important part of your equipment—especially in hot weather.

Posed pictures are good when it is desired to illustrate the right and wrong way of performing an operation with the same subject. But oftentimes the best pictures are the ones taken on the spur of the moment. However, when a "candid" shot is to be taken of a dangerous operation, using a flash attachment, be sure to warn the operator lest the sudden flash of light disconcert him and cause an accident. In taking pictures, be sure to take the good workers as well as the bad ones. Sometimes it is a lot more effective in putting a point across to show a man who is working comfortably with his safety equipment on than to catch one unawares when he is not following prescribed safety rules.

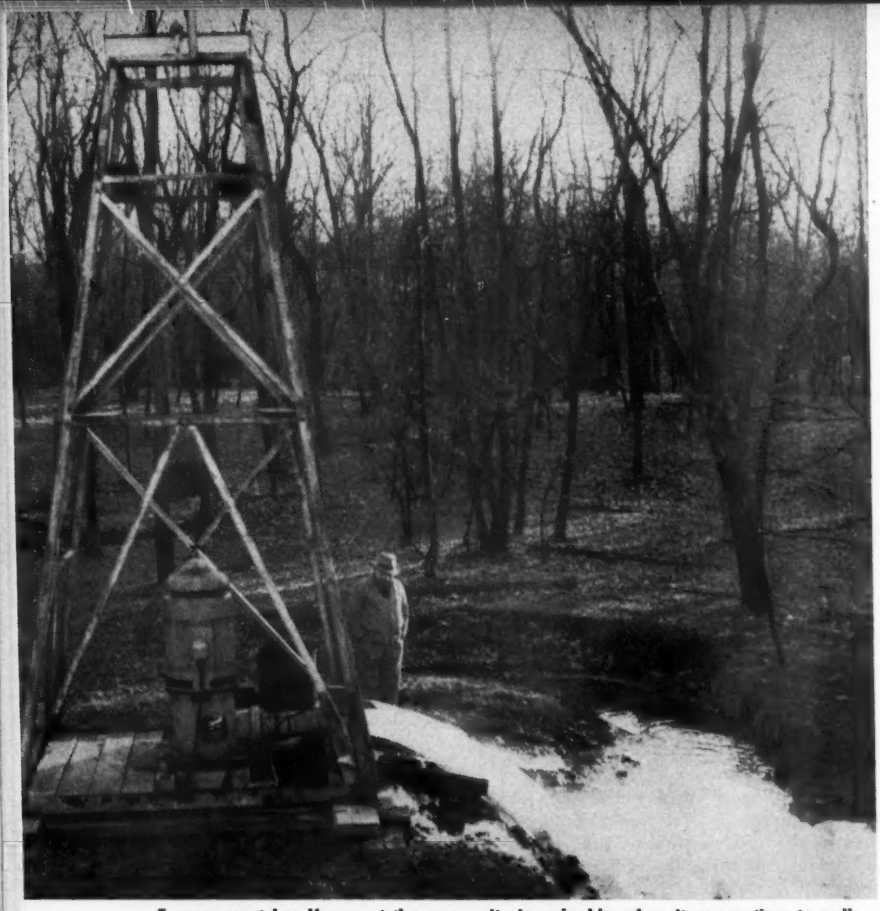
Drawings Also Help

So far we have been talking mostly about actual photographs of scenes and written material. At some properties effective use has been made of posters drawn on tracing paper and printed in the blueprint room. It is not necessary to be a finished artist to illustrate a point effectively. The better the drawing, of course, the more pleasing effect it will have to the viewer, but well-lettered posters with relatively crude drawings will often draw more attention than posters where the art work is without flaw. Everybody likes to criticize and while criticizing the artist's technique, the story he is trying to put across will often register on the subconsciousness of the critic.

Teach them that safety pays

During World War II, the armed services found how effective visual aids to education are in teaching men to learn new operations or to perform those they already knew in a safe manner. Schools, colleges and universities all over the country are installing special departments to make and supply visual aids to educators. So vital a subject as safety in the mineral industry certainly deserves the most modern methods of teaching—and it is so easy when you try.

Pictures in employes' magazine, show wrong (left) and the correct (right) way to bar down a slab, bring the safe practices story home. (Peabody People, Peabody Coal Co., Illinois)



A permanent headframe at the pump site is valuable when it comes time to pull the pump

Deep Well Pumps In Mining

Testing, Installation, Safety Devices and Good Maintenance Practice All Play an Important Part in Pump Operation

By E. I. McGEE
Registered Mechanical Engineer

PART II

PUMP manufacturers have striven faithfully to produce pumps as trouble-proof as possible, but few, if any, have facilities for testing the complete assembly in a deep well setting. Some of them have to test half or less of the multiple stage pump bowls at a time in a shallow sump and combine the results mathematically to be able to quote approximate heads, capacities, horsepowers and efficiencies.

Operating results at the mine can be surprisingly different from those predicted and can prove troublesome. For instance, friction of the water in the column can only be quoted from theory. Likewise, the shaft friction in a hundred or more bearings spaced only five ft apart will change rapidly with very slight misalignment. The factory load on the thrust bearing does not include six to ten tons of dead weight of the shaft when tested. This might result in a cooling problem at the mine. Slight factory errors in workmanship on shaft, tube and column lengths often accumulate and on the final assembly at the mine cause costly delays while correcting the error. The manufacturer must be allowed some tolerance for all this, because it would cost several thousand dollars to make and unmake a full assembly at his plant, even if he had a deep well for it. However, he can furnish a competent man, possibly his sales-service engineer, to stay on the job at the mine while the pump is installed, tested and checked for capacity, speed, horsepower, efficiency, free running and heating of bearings, lubrication, etc., etc., after at least eight hr of steady operation.

To make this test it should be determined ahead of time whether the service man will furnish orifice plates or other devices for measuring the volume, or if the mine shall furnish the same or build a weir. Laboratory instruments should be used for checking the power input to the motor. The commonly used switch board instruments often err greatly. If the factory is not too far away, it is well worth the time of the customer's engineer to go to witness any factory pump test.

Test Equipment Needed

Every pump of moderately large capacity should be permanently equipped with a weir, orifice plate or other water measuring device, accurate electrical instruments and a float gauge or other means of determining the elevation of the water in the mine. These should be read and recorded daily for future comparisons.

If the output goes down or if the power input varies, it is not always the pump that is changing. It could be a change in the elevation of the pool, the condition of the strainer, or debris around it, or the column could be clogging up with "yellow boy" or

hard scale. The impellers might be dragging at either top or bottom of the bowls and need adjusting. The latter point should always be checked after the pump has been operated for several hours and all bearings, shafts, tubes, etc., are thoroughly seasoned up to their normal running temperatures. The factory man should check this thoroughly before leaving and instruct the plant mechanic or pump attendant why and how to do it.

A record should be kept of the vertical relation of the top of the drive shaft to the top of the nut or some other definite point above the thrust bearing. Before starting to install the pump, the impeller and bowl assembly should be carefully checked to determine how much end play is present and the amount recorded for future references, as referred to later under "Important Details."

Facilities For Installation

Where the requirements seem to call for a Vertical Turbine Deep Well Pump, many factors enter into its location.

The first and often the most important is the location of the best point underground for the pool or sump. The second usually is the relation of the underground site to conditions on the surface. If an open shaft is near the underground pool and an open stream on the surface, into which it is permissible to run mine water, the location is a natural. If this shaft happens to have a substantial head frame or tower over it, the problem is almost fully solved.

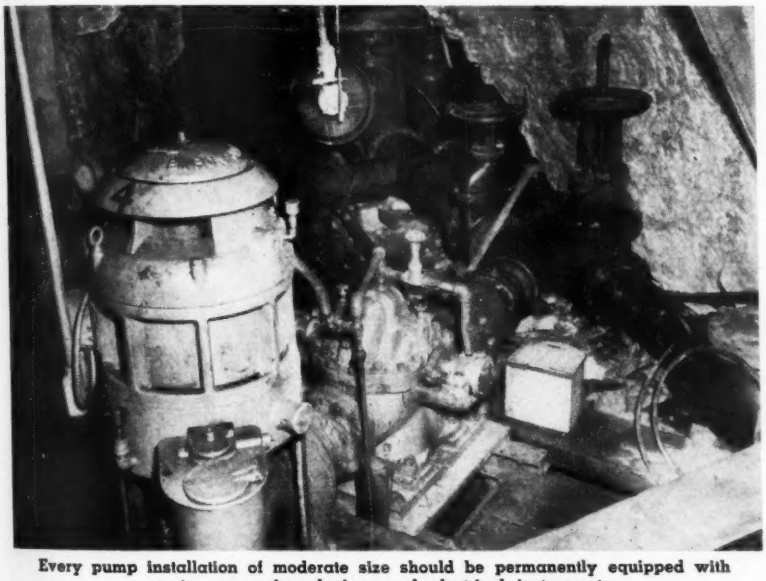
In case the surface problem only is solved, and working conditions underground will permit, it is usually better to establish a sump, even at the expense of extensive ditching or tunneling to get the use of the shaft and tower rather than put down large boreholes and provide some means of handling the pumps.

If bore holes are to be used for deep well pumps, care must be taken to see that they are straight and as nearly vertical as possible. Experienced drillers, using either rotary or churn drills, will guarantee a hole to be both straight and vertical within ½ in. in 20 ft or 0.2 percent. This is alright but requires exacting skill to accomplish and is so different from ordinary well drilling that the engineer should check the drilling progress frequently. A hole much more crooked than this can be successfully cased and grouted, but a shaft driven deep well pump will not run long in a crooked hole.

Deep well pumps are rated by sizes of well casings used. For instance a 16-in. pump will go through a normal weight 16-in. O.D. casing which means the bowls, strainer and all flanges will be about 15 in. in diam. The catch is, the casing must be straight, or the pump column with its numerous flanges will have to yield to any crookedness of the casing. In turn, the shaft, especially if of the water lubricated type with bearings every ten ft, anchored at the column flanges, must yield to the curves of the column. Which means the rotating shaft must reverse its bends at every revolution.

An oil-lubricated shaft will have a much better chance of survival if the oil tube is stabilized within the column at intervals of 50 ft. Some manufacturers have left out the oil tube stabilizers, thus allowing the oil tube to assume as nearly a straight line as possible. This, however, can prove disastrous. One make of pump, otherwise very well built, did not have oil tube stabilizers, even though the pumps were bought to hang freely in open shafts. Due to changes in relative temperatures between the oil tube and the column, it seemed impossible to keep the oil tube in tension. The result was, the five-in., extra-heavy oil tube weaved around inside the 350 ft of rubber-lined, 16-in. column until it not only beat the rubber lining off both the inside of the column and the outside of the tube, but continued to beat through the steel tube until the sleeve threads inside the tube were exposed. The tube separated and ruined the pump.

The only way to be sure the drive shaft has a chance in a bore hole job is to provide a casing at least two in. larger than the pump size and then keep the hole as nearly straight and vertical as possible. If the hole is not vertical it should be checked for angularity at the top of the hole and the pump base, pedestal and motor set at the same angle in order to keep the shaft straight.



Every pump installation of moderate size should be permanently equipped with water measuring devices and electrical instruments

Safety Devices

Every pump should be equipped with a barring device that can be easily handled by one man. It should be accessible from a convenient work level, usually just below the motor at the shaft coupling, and should be of the ratchet-spanner wrench type in case power should accidently be applied while testing. The pump should always be tested by hand through a full turn to observe if the bearings are free, if the impellers are free and if the motor non-reverse ratchet is in order before applying the power.

Nearly all thrust bearings and driver heads with the large nut for adjusting the vertical position of the impellers with relation to the bowls are on top of the motor and usually 12 to 15 ft above the ground or working area. A safe platform should completely surround the motor at a convenient level and be guarded with a railing and toe board and have a permanent ladder attached.

The wrench required to raise or lower some 16,000 lb of shaft with a nut on a 3½-in. thread diam. is no toy. A box wrench with six or seven ft of 2½-in. pipe for five or six men to strain on should not be handled from a step ladder. That is what has been furnished with many pumps, however. For safety's sake at one pump site, a lifting rig was devised that sets on top of the big thrust bearing on top of the motor. A ten-ton hydraulic jack with a hose to a small hand pump was used. The motor shaft was tapped for a 1½-in. stud linked to the jack so one man could easily and safely lift the shaft and turn the big nut, then free, with his fingers. With this it was easy for one man to check the impeller adjustment in a very short time.

The importance of this feature is

best described by a recent experience at one mine. Gravel or hardened silt had lodged on top of the impeller when the pump was stopped and the pump shaft was still warm. Upon being idle for a few hours, the shaft cooled and contracted so the pump could not be started, because of the gravel bound against the top of the bowl. Setting the impeller down ¼ in. freed the impeller. Running the pump dislodged the obstruction. Before the pump shaft warmed up too much the pump was stopped and the nut readjusted to its proper position.

Every pump should have a device that automatically cuts the power off if the flow of water fails for any reason. A disk made of wood or acid resisting metal can be hung vertically against the end of the horizontal outlet from the pump so it will rise while the water flows and keep a switch closed. The device sometimes needs a snubber on it to prevent a constant flapping on the water that soon wears out the moving parts.

Another device is made up of two stainless bars supported on insulators so their ends are in the stream of water. This completes a circuit which is broken at a predetermined low flow. There are no moving parts and nothing to wear out. Either type is wired to the starter control station where the operator holds a spring push button shunt closed until the water comes up to complete the circuit.

Most thrust bearings generate a lot of heat. An accurate thermometer should be permanently installed where it can be easily read. A temperature relay can be wired into the control circuit to stop the pump at a predetermined high temperature.

If the oil coolant is piped through external coils in cooling water, be sure the cooling coil is on the pressure side of the oil pump. Otherwise, a leak in the coil would draw water and quickly ruin the bearing. Also be sure a pressure switch is on the pressure side of the oil pump so the main motor will be stopped if the oil pressure fails.

Protect Intake

Each pump must be equipped with an efficient and durable strainer. The strainer should be bolted, riveted, or welded to the pump inlet. Net area of the strainer openings should be four or five times the area of the pump inlet, so when debris has closed over half the openings there is still at least a two to one ratio.

This is one reason for using a check valve at the top outlet of a deep well pump. A good tight check valve and a good tight stuffing box on the shaft can hold a few feet of water up in the bowls for hours for a restart. Another point to watch is to keep the pump inlet submerged to prevent the formation of a vortex. This will admit air with the water to the impellers and set up a vibration or hammer that can become very severe and endanger the equipment if allowed to continue.

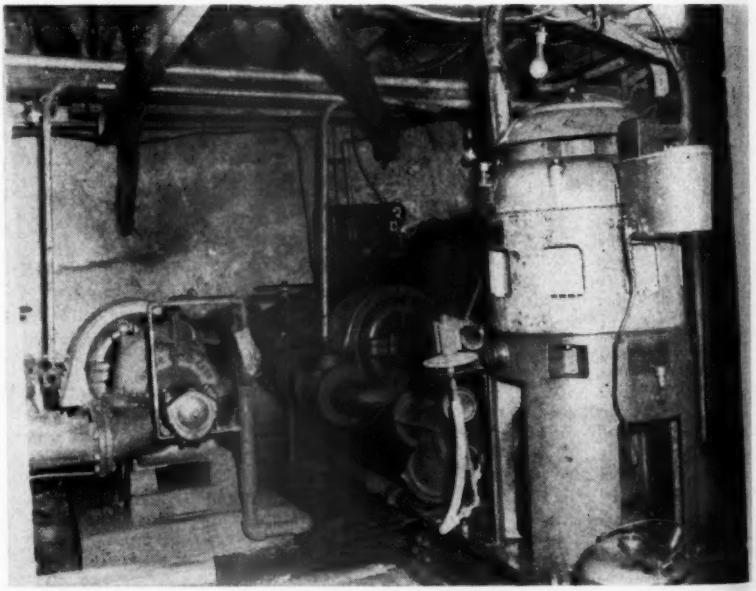
Shallow sumps are to be avoided wherever possible. Especially for pumps hung free in deep shafts. Several instances where 12-in. columns hung in 550-ft shafts have been observed. When the pumps were running and submerged in anything less than five ft of water they would gradually develop a pendulum swing motion in a circular or elliptical path of as much as four to five ft of sweep. This could not be detected at the top of the column but it goes without saying that it is not good for the 55 sets of flanges, bolts and gaskets of the column. Because one of the three running pumps might strike another one, it was shut down. As the water in the sump rose, the swinging gradually subsided and at six or more ft of submergence, stopped entirely.

An automatic safety device to cut power if the flow of water stops should be a part of every pump installation

Details of Importance

For oil lubricated pumps, specifications should rigidly stipulate that the oil tube must be secured so it cannot unscrew. This is not always easy to do. At one mine the problem was solved by screwing the inside shoulders of collars down solid on top of the tubes; above and free of the tensioning nuts. On these collars were welded steel plate flanges about ten-in. diam with six or eight holes on about nine-in. circles for diametrically opposite bolts to two turn buckles. The other ends of the turn buckles were attached to the motor pedestal at diametrically opposite convenient points. When these two turn buckles were tightened up, the tube was put under a torsional strain in the same direction that the shaft rotated, that is, against unscrewing the tube. It was surprising how often the slack could be taken up in the threaded tube couplings. Within a year, more than a full turn had been taken up on some of the deeper settings. In as many as 100 joints this was not much for each joint but the slack could concentrate at one joint and leave an 1/8-in. gap to leak water into the tube. No leakage developed as long as the tubes were kept screwed up tightly.

On later pumps, a device for keeping the oil tube under uniform longitudinal tension was applied because it was found that some pumps would vibrate badly if the tube warmed up and expanded more than the column. If the tube tension nut was tightened up when warm, it was too tight after



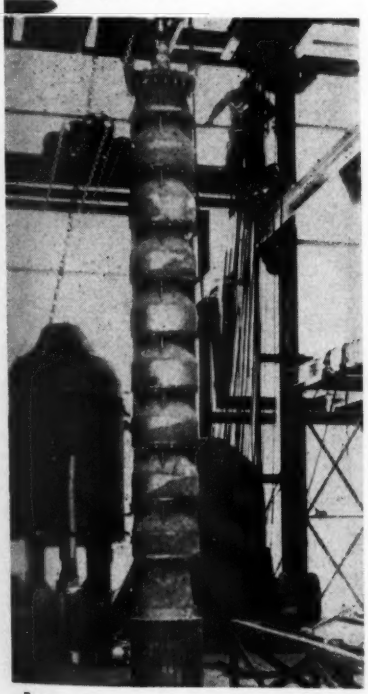
It is good practice to start feeding oil to the pump bearings ½ hour before starting the pump if it has been idle for more than a few hours

stopping and cooling, thus straining and loosening the threads. Some of the pumps pulled the tube sleeve couplings apart. Heavy springs were applied for tensioning the tube approximately the same at all temperatures, thus helping to avoid loosened threads and leaks in the tubes.

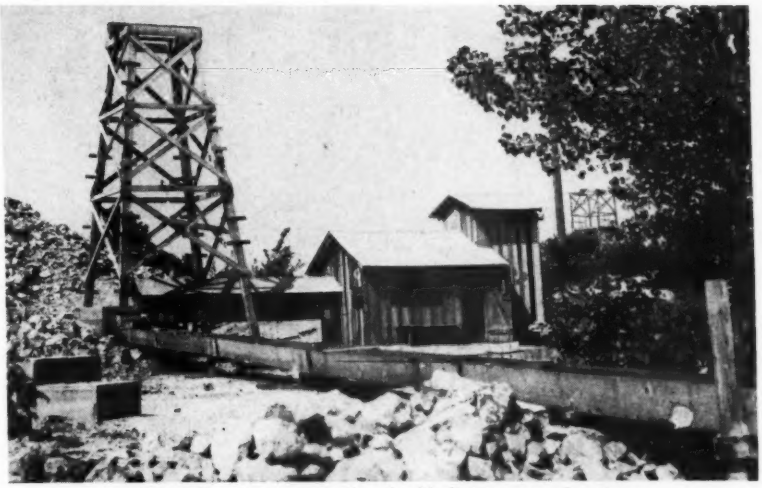
It was surprising how much the springs depressed just as the pump took its water and the motor went into full speed, indicating the impact of the sudden water surge stretched the column momentarily at least an extra ½ to ¾ in. This, of course, would have stressed the tube also since it is screwed tightly into the top bowl where the column is also attached. The tube being of lower structural strength could be damaged if it were not for the springs.

In deep settings, where closed impellers have already been urged, the skirts on the impeller inlets should be long enough to provide adequate seals after the vertical relation between the pumps and bowls has changed considerably. Experience has proven that provision should be made for ¼ in. of change in relative lengths of shaft and column per 100 ft of depth plus ¼ in. top clearance at the initial setting to allow for temperature changes and shaft stretch from hydraulic thrust.

Impellers with 1 3/16 in. vertical clearance have been known to rub both top and bottom faces in 430-ft settings. The skirts naturally need to be longer than this to provide a seal while the impellers are running in their high position.



Large pumps pose sizeable installation problems



Generally mine topography should dictate pump location

Lubrication Problems

One seemingly trivial point has proved to be of real importance in several instances. That was the oil grooving of the drive shaft bearings in the oil tube. It was observed many times after starting a pump that had been idle for a few hours that the oil would cease to flow and sometimes was forced back up and out of the top of the tube. Somewhere, down among the numerous bearings, the air in the large spaces between the shaft and the tube had started to warm up and expand. Apparently it was easier to force the top oil up than to force the rest of it down. Each bearing was grooved inside and also had a bypass groove on the outside of the bushing, but with oil in both grooves, the oil and air could not bypass each other. Hence some bearings down below were not getting a fresh supply of oil until the air had escaped. When the pump is running, oil is thrown off the shaft between bearings and it must run down on the inside tube surface until it comes to the next bearing where it must surround the shaft again before it can go down the bypass groove.

The bypass groove should start at a higher point than the bearing groove so it can bypass air while oil goes down through the bearing. Then if the bearing groove gets clogged, the oil can rise ¼ or ½ in. and go down the bypass to the next bearing. Not many manufacturers have observed this point and only provide a bypass of any sort because it has been urged upon them.

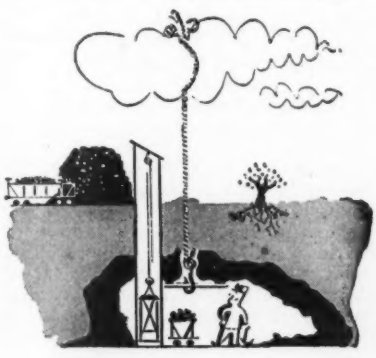
Since all these pump types are always primed as long as the lower impellers are submerged, no priming system of any type is needed. This allows them to be operated automatically with the simplest methods of control. A float in the sump to operate a switch to keep the water down to a constant level, a clock timed switch to take advantage of off peak power rates or a remote manual push button can be used.

These do not provide for lubrication controls where deep settings require prewetting of water lubricated bearings, but solenoid valves can be arranged to do this from a remote point.

Oil lubricated pumps usually have solenoid valves to provide oil only when needed. It is good practice to start feeding oil ½-hour before the pump is started after an idle period of more than a few hours so the oil can reach the upper bearings that dried off first after the pump was stopped. For as little as oil costs, it can be allowed to drip during short shut down periods rather than have a full time attendant. A large reservoir filled once per day will provide this. One drop of oil per bearing per minute has been found ample for any depth of setting.

Conclusion

This review does not pretend to cover all the questions that will arise but is an endeavor to cover most of the highlights of experience gained in 15 years with deep-well pumps in the field and factory, so that others might be able to avoid the errors previously made by both manufacturers and users.



Methods of Belt Conveyor Loading

By R. U. JACKSON, J. W. HARDY and B. L. WALDRUFF

Conveyor Belt Life Depends to a Great Extent on the Manner of Loading

THE life of a conveyor belt depends to a great extent on the manner in which the load is placed on the belt. When it is considered that the belt cost normally constitutes 50 percent of the complete conveyor cost, it becomes evident that thought and expense to protect this vulnerable piece of equipment is well worth while. In transferring from belt to belt, in loading from shaker or chain conveyors, or direct loading from machines or shuttle cars, economy is the basic requirement —just as it is for all mining problems. The ideal transfer method would be to have the stream of coal travel at the speed of the belt, in the direction of belt travel, and without drop or impact, to provide a perfectly even and uniform cross-sectional load on the belt without spillage.

Conditions Determine

All of these requirements cannot be obtained in practice, and a process of elimination must be used in order to justify the attainment of as many ideals as possible. This requires a number of considerations. The actual value of the conveyor belt must be known and its estimated normal life must be predetermined in order to evaluate the number of ideal conditions that can be eliminated as each of the eliminations will definitely reduce the life expectancy of the belt, thereby increasing cost per ton. This analysis must be balanced against other factors of economy.

Investment Costs and Preventive Maintenance

In shuttle-car loading to a belt, the economic cycle of the shuttle is very important. To unload a six-ton car in one minute requires a belt speed capable of handling 360 tph. This shuttle would have a bed of coal at least three ft deep, and due to chain action, side friction, etc., would at times slough off and load in small peaks rather than a uniform cross section. The belt speed must therefore take care of the peaks to prevent excessive spillage because this spillage also reduces belt life. The added speed brings each section of belt under the loading point more often, which in turn adds to belt wear. All this revolves around the economic cycle of the shuttlecar. If the car takes two minutes to unload, the rate would be 180 tph with half the belt speed and half the wear at the loading point. However, the loss of one minute in a shuttle car cycle would more than offset the additional cost due to belt wear.

Using six-ton shuttle cars assumes a high capacity mine and high coal with a 36-in. belt in the room entries. If this belt is on 2000-ft centers (four plies of 42-oz duck, with ⅛-in. top cover and 1/16-in. bottom cover with a has a value of about $32,000. If this breaker strip of No. 2 grade rubber) it conveyor is the service haulage unit from a 200 tph section averaging 12 hr per day operation, 200 days per year for five years, the direct belt cost plus three percent annual interest and two percent yearly maintenance will amount to about 1⅗ cents per ton.

Can Extend Belt Life

Even though a five-year life expectancy has been accepted as a standard, most belts properly installed and maintained have exceeded this life. Proper loading, proper protective devices, and elimination of major spillage should double this life at the least and thereby reduce the direct belt cost to less than one cent per ton for the above-assumed operation.

Protective devices should include a centrifugal switch to guard against drive slippage and for proper interlocking a series of belt units; pull-cord switches; squeeze-wire switches to provide emergency control and guard against roof falls, and training idlers for the return belt, particularly to prevent edge wear and belt damage.

Shuttle Car Onto Belt

Shuttle car loading directly onto a conveyor constitutes one of the greater hazards to belt life. Surge loads are high causing damage by turbulence, scuffing, impact and spillage, while frequent misalignment is caused by bumping the light-framed conveyor with the shuttle and impact when side-loading. A unit that is pressingly needed is one that will take the entire load of the shuttle car quickly and then gradually transfer this load uniformly at the proper rate to the belt conveyor. This unit in itself should be readily maneuverable. To date such a device that will meet all requirements is not in operation although several designs are in progress. The principal devices now in use to load from shuttle cars are described briefly in the following:

Loading directly onto belts constitutes one of the great hazards to belt life

Flare Plates or skirt boards are most common and economical but have few of the attributes of a good loading station. The length of this type station required to load the belt correctly depends upon the width of the open belt between the opposing flashings, the rate of load, size of material and belt speed. This length is usually determined by the experience of the belt foreman.

Hinged Flare Plates are made in two types for intermediate loading stations. One is a manual type in which the flare plates are lifted back off the belt when the station is not in use. When the plates are up, inby coal passes through the station without interference and men and materials on the belt can safely pass the loading station. The other is the self-actuating type with a flare on the inby end of the counterbalanced skirt board. An inby load on the belt strikes the flare, raising the skirt boards off the belt to allow load passage through the station.

A Slow Speed Chain Conveyor accomplishes the purpose of a feeder by receiving the surge load of the shuttle car and placing it on the belt at belt capacity. When the shuttle car discharges, the coal builds up rapidly on the chain conveyor, but by aid of retarding baffles on the side of the hopper, the load is leveled into a bed within the capacity of the conveyor belt. By regulating the speed of this unit, a limited degree of belt layer loading can be accomplished.

A High Speed Chain Conveyor is normally used for loading over the tail pulley where it can put the coal on the belt at approximately belt speed and in the direction of travel with minimum scuffing or turbulence. However, where the entry height permits it to be mounted high enough to let coal on the belt pass under, there is no reason why it cannot be used advantageously for belt loading at any point along the conveyor belt.

The chute in the above illustration changes the path of the coal so that it is moving in the same direction as the belt

Slow-speed chain conveyors can be used to smooth out surge loads from shuttle cars

Shaker Conveyors with Hopper or Trough Capacity are wheel mounted and actuated by a shaker drive. These are designed to receive the full shuttle car load on the hopper and discharge it onto the gathering conveyors at belt capacity.

Capacity loading of belts can be attained with shaker feeders

Belt Transfer Points

With the load on the belt in a conveyor mine, the problem of transferring from one belt to another arises, either "in-line" or at right angles. In-line transfer requires no more than flare boards when the size consist of the load is small and the two belts are traveling at nearly the same speed. If large lumps are a part of the load, a chute is necessary to reduce impact. A bar screen chute will allow the small coal to fall through and cushion the belt against falling lumps. Drop of material from one unit to the next should be held to a minimum vertical distance in order to reduce coal breakage and equipment wear. It is advantageous to lap the head of the feed conveyor far enough over the tail pulley of the out-by unit so that dust from the belt scraping device will fall onto the under belt.

Speed-up conveyors answer most of the requirements of the "ideal" transfer

Right angle transfer can be accomplished by means of a curved chute to place the coal on the under conveyor in the direction of belt travel. If the under belt receives material from several loading points, the bottom of the chute is hinged and counterbalanced so that coal on the main belt lifts the chute and passes beneath. Flare boards are usually required to realign the load.

Problem Needs Study

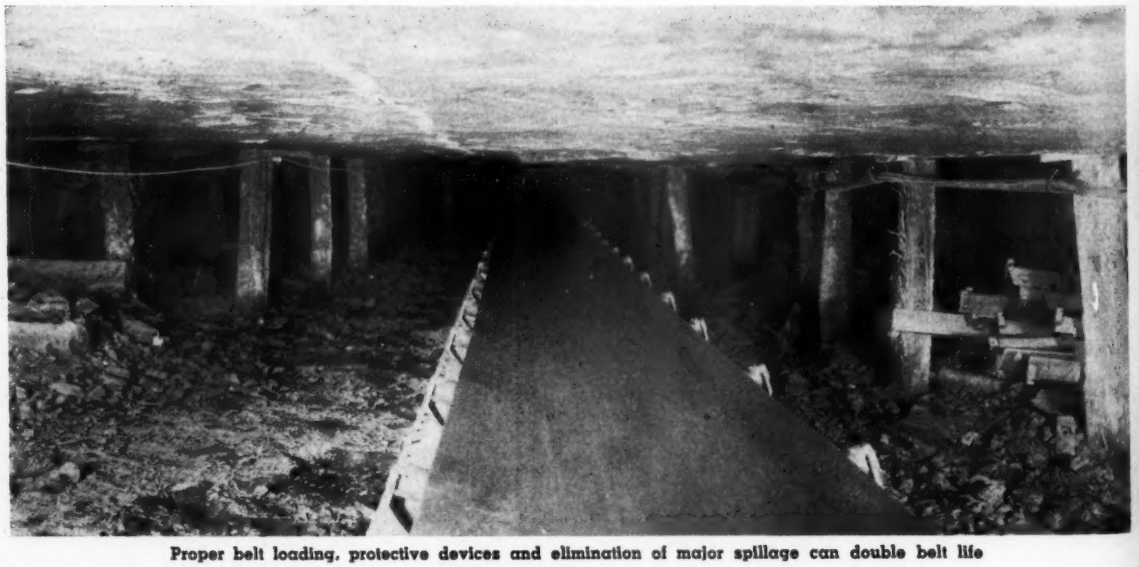
Although loading chutes for end or side loading have been developed and designed by each conveyor manufacturer, they will not meet all of the requirements of local conditions. The chute installation must be such as to take a high percentage of coarse coal one minute and fine coal the next; wet coal one minute and dry coal the next. Each installation must be observed in operation with the realization that field alterations are going to be necessary because no two mining operations are ever duplicated even though conditions may seem similar. Unfortunately, many operators will use a makeshift transfer chute or makeshift skirtboards rather than develop these to suit conditions so they will be an asset. Some of the best belt to belt transfer chutes have been installed by the operator taking the recommendations of the manufacturer, and making field fabrication to suit his particular operation.

A device, however, that will meet most of the requirements is the transition conveyor or speed-up conveyor. This can be a belt unit, possibly 15 ft long, with small terminal pulleys to minimize drop, placed parallel to and directly over the feed point of the main conveyor. The belt should have approximately the same speed as the main belt and should take all the impact damage from the loading unit, center the load, start it in the proper direction and put it on the main belt at the proper speed. This type unit does need additional head room at the loading station. If conditions require taking down roof, then this cost plus the cost of moving as the loading point changes must be weighed against the reduced belt cost to determine its real value.

Where there is dual loading of two cross belts to a main haulage belt, the introduction of a transition belt should be a definite advantage for reduction of impact belt wear, spillage, and belt loading of the main belt.

Layer Loading

The increasing use of multiple belt conveyor systems transporting from several production panels indicates that layer-loading will be more extensively used than the prevalent full-belt loading at shuttle or transfer stations. The present methods cause too high a percentage of downtime when the shuttles or feeder belts are stopped because of a passing fully loaded belt. Layer-loading requires a regulated feeder that will only partially fill the belt so that out-by coal can be placed on top of the partial load. This will require additional regulating feeders but will result in correspondingly less scuffing and impact damage on the belt.



Proper belt loading, protective devices and elimination of major spillage can double belt life

Operators Corner

Grinding Cemented Carbide Tools

LOW TOOL COST is one important objective of an efficient mine operation. The secret of lower tool costs per ton is good tool mantenance, and the use of maintenance equipment which provides the most returns on the per-ton-dollar basis.

So far as mining tools are concerned, proper grinding is a must, if you expect to realize maximum tool performance in succeeding applications of the tools. Lack of proper grinding equipment for tools and poor grinding practice can skyrocket mining costs just as effectively as a few unexpected roof falls.

What kind of grinding equipment should a mine have? The answer hinges on the type of operation—whether it's a small or large mine or just a medium size operation.

According to Carboloy Department of General Electric Co., super-hard, high tonnage cemented carbide tools can be reground quickly and easily by maintenance personnel with a minimum investment for specialized grinding equipment.

Types of Equipment

Mines that resharpen large quantities of carbide mining tools should invest in a heavy-duty pedestal type grinder. For small or medium tonnage mines, bench type grinding equipment works out effectively.

In looking over your grinding equipment, chances are that existing equipment can be readily adapted for sharpening carbide tools. It is helpful if the grinder has a bar type table to help maintain correct clearance angles, when grinding finger bits and CC-style cutter bits. The table also allows both corners of the grinding wheel to be used as well as the wheel periphery. If a rest is not on hand, one can easily be built by welding extensions to the standard grinding equipment.

To resharpen carbide-equipped coal mining tools, great stress is placed on the correct grinding wheel. Proper use of aluminum oxide and silicon carbide wheels will do much to speed up tool maintenance operations, and increase the maximum tonnage produced per shift.

Use Proper Wheel

When using aluminum oxide wheels, standard 24-grit wheels, at least 10 in. in diam or larger are recommended for shaping or removing excess steel from the shanks of mining tools. A wheel of this type is commonly used to rough grind all steel tools.

Silicon carbide wheels (green color) should also be of the same size, but of the 60-grit type for grinding cemented carbide surfaces. The different appearance of these wheels help to distinguish them from aluminum oxide wheels (gray color) for grinding steel.

It is important to remember that exceptionally hard grinding wheels slow down the sharpening action and cause tools to overheat. They also indicate that it is just as important to maintain the wheel surfaces properly to obtain good results in tool maintenance.

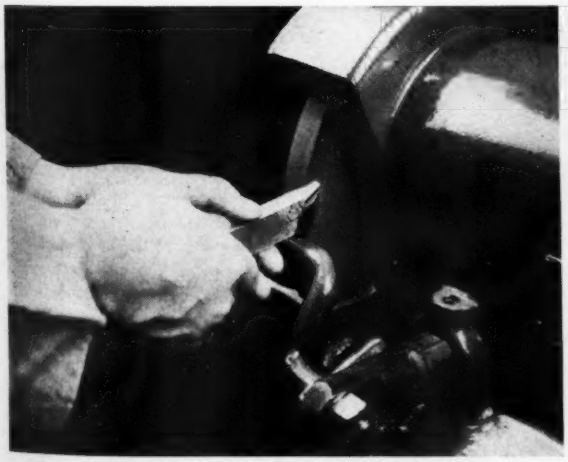
Two important items to remember are: (1) the abrasive grains in aluminum oxide wheels are too coarse and too soft to cut cemented carbide effectively; and (2) on the other hand, the cutting action of silicon carbide is effective only when used on cemented carbide surfaces. The relatively soft shank or body steel of mining tools tend to "load" silicon carbide wheels reducing their cutting action.

In dressing aluminum oxide and silicon carbide wheels, it is good practice to reshape the wheels as required with a star type wheel dressing tool. Amount of redressing required directly affects grinding wheel life. Recommended factory maintenance procedures should be followed to get the most out of the wheels and tool grinding. A standard star dresser, for example, can be used very effectively to dress a crown or chamfer on wheels used for sharpening cutter bits.

Watch Tool Profile

When grinding carbide tools, watch the original profile of each mining tool. It should be maintained as closely as possible when resharpening. Also, be sure to duplicate all clearance and relief angles—end, side, top—nose and heel radius, and allow enough steel to support the tip. Long economical tool life can be expected if the original tool geometry is correctly maintained.

(Continued on page 58)



Use proper wheel for each material, follow original tool contour and grind dry. Note how rest comes in handy

Standard star-type wheel dresser for shaping grinding wheels will pay off

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Wheels of GOVERNMENT

AMC

As Viewed by HARRY L. MOFFETT of the American Mining Congress

AN intensive drive is under way in Congress to adjourn by July 31. Leaders have ordered a stepped-up tempo and have lengthened the hours of floor debate in both Houses in an effort to meet the adjournment goal.

During the past month Congress has cleared the decks of the major appropriations measures, including that providing funds for defense, and has stamped approval on a one-year extension of the Trade Agreements Act. In the closing days of June the Administration's tax bill was sent to the Senate floor and after a week of debate was approved by the upper chamber and sent to conference with the House to iron out the differences.

However, Congress is still confronted with some major hurdles before the final tap with the gavel signals a return to the hustings for the coming political campaigns. Important segments of the President's legislative program have not been acted upon including the foreign aid bill, the bitterly contested farm program, broadening of old age benefits, a hike in the public debt limit, revision of the Atomic Energy Act, health legislation, and a clean-up of appropriations measures. Seasoned observers feel that the July 31 adjournment target is too optimistic and that a more realistic date is August 16.

Federal Aid for Coal

On June 29, a committee of leading coal producers and nine members of Congress, headed by Senator Sherman Cooper (Rep., Ky.) conferred with President Eisenhower and submitted a program of Federal action to encourage U. S. coal production and maintain an annual output of at least 450 million tons.

As a result of the conference, the President ordered Commerce Secretary Sinclair Weeks to establish a special Government committee to consider the coal industry's proposals and to attempt to bolster sagging domestic production.

Those attending the conference said the President listened with interest to the discussion of the industry's situation and appeared sympathetic with the program submitted.

The coal industry leaders called for a program of Federal action to: (1) restrict imports of foreign residual oil, (2) limit imports of Canadian natural gas, (3) prevail upon European countries to remove import restrictions that discriminate against U. S. coal, (4) protect coal from excessive natural gas competition domestically, (5) increase the use of coal in Federal buildings and installations, (6) limit freight rates on coal, (7) finance cooperative research to expand coal's markets, and (8) establish regular channels of communication between the coal industry and the Government at Cabinet level.

Trade Act Extended

In an unusual burst of speed both House and Senate quickly approved a one-year extension (until June 12, 1955) of the Trade Agreements Act, after adopting an amendment which bars further tariff cuts on commodities vital to defense. One other amendment was written into the extension measure. This specifies that passage of the measure is not intended to imply approval by Congress of the General Agreement on Tariffs and Trade (GATT).

The President signed the bill even though it differs from the proposals he made to Congress early this year. At that time he called for a three-year extension of the Act and authority to make further slashes in tariff rates. All attempts to write these proposals into the measure during Senate consideration were soundly defeated.

During the debate in both Houses, floor leaders pointed out that extensive hearings will be held by the House Ways and Means Committee and the Senate Finance Committee on foreign trade policy and the Randall Commission's recommendations at the next session. Rep. Reed (Rep., N. Y.) told the House that these hearings will be the most exhaustive "that we have ever held at any time." It is expected that at that time the effect of excessive imports of residual oil and of metals and minerals essential to national defense will be aired before the committees by domestic producers of coal and other minerals.

Meanwhile, Congress has also approved a one-year extension, until June 30, 1955, of the present law suspending the two-cents-a-pound import tax on copper. This continues the requirement that the duty be reimposed by the President when the price of electrolytic copper falls below 24 cents a pound for any calendar month. A two-year extension of the measure suspending the import duty on crude bauxite was also written into law.

In approving the appropriations measure for the State Department, Congress adopted a proviso making it clear that none of the funds for the Department can be used to pay the salaries and expenses of the Metals and Minerals Staff in the Office of Economic Affairs. Congress explicitly directed the State Department to turn to the Interior Department for information and policy guidance on metals and minerals activities.

New Minerals Policy Demanded

The special Senate Minerals, Materials and Fuels Economic subcommittee, headed by Senator George W. Malone (Rep., Nev.), after a ten-

Washington Highlights

COAL: Federal program studied.

TRADE ACT: Extended one year.

MINERALS POLICY: Proposed by Senate Committee.

TARIFF RELIEF: Urged by Western Senators.

STOCKPILING: Added funds sought.

PUBLIC LANDS: Law revisions advance.

TAX BILL: In Conference.

month exhaustive investigation of the availability of minerals and metals for U. S. defense, has issued a formal report calling for adoption of a new national metals and minerals policy based upon dependence upon the Western Hemisphere for critical materials.

The recommendations for U. S. minerals policy included (1) closer economic cooperation between countries of the Western Hemisphere; (2) higher depletion allowances for U. S. mineral production; (3) an accelerated stockpiling program; (4) a five-year research program into new uses and improved methods of beneficiation of critical materials; (5) maintenance of a "long-range" market price for uranium produced in the Western Hemisphere; (6) expansion of the domestic titanium goal to 150,000 tons annually; (7) improved regulation of petroleum, gas and coal resources in the U. S.; (8) repudiation of all international controls over production, prices, and supplies of critical materials; (9) the settling of definite responsibilities upon the various agencies involved in stockpiling activities; and (10) a review of Securities and Exchange Commission procedures to clarify the duties and responsibilities of that agency.

The Committee said the results of its study indicated that the Western Hemisphere can readily become self-sufficient in the critical raw materials necessary to win a war or maintain a balanced peacetime economy.

Senator Malone said that mineral and metal procurement policies since World War II "have staked our liberties and lives on servicing our critical material needs from areas which would be neutralized in time of war." He declared that the committee had obtained evidence that these policies were deliberately planted by the late Harry Dexter White as Assistant Secretary of the Treasury and former Government officials "who put the interest of totalitarian Asiatic States above the welfare of the United States."

Malone also said that the committee's findings completely refute the defeatist propaganda that the U. S. is a "have-not" nation. He said our reserves and resources in vital minerals are the richest in the world.

Lead-Zinc Tariff Relief

On June 29 the Conference of Western Senators, headed by Senator Pat McCarran (Dem., Nev.), met at the Capitol and agreed to urge President Eisenhower to invoke the "escape clause" provisions of the Trade Agreements Act and boost tariff rates on lead and zinc to save the domestic industry "from extinction."

It was stated at the Conference that the Tariff Commission had unanimously recommended to the President that the full measure of tariff relief under the escape clause be granted to the lead-zinc mining industry. The Commission's recommendations came after an exhaustive study of the domestic lead-zinc situation and as a result of the industry's petition for escape clause relief. President Eisenhower at this writing has not made known the contents of the Commission's recommendations nor has he acted on them. He is expected to do so shortly.

The Conference of Western Senators heard industry and Government spokesmen outline the situation in the lead and zinc mining industries, and sent a letter to the President calling for favorable action on the Tariff Commission recommendations.

Stockpiling Program

In anticipation of further programs to increase the stockpiling of strategic and critical metals and minerals, the President late in June called upon Congress for a supplemental appropriation of $380 million to acquire materials for the national stockpile. Under his request the money would be made available as of July 1 and until expended by the General Services Administration. It is expected that Congress will approve this request.

Meanwhile, the Office of Defense Mobilization has issued its first directive on the so-called "long range" stockpiling program. It has told GSA to buy newly-mined domestic lead and zinc for the national stockpile at the market price. No details as to quantities or length of the contracts were made public. GSA has also initiated a 3½ year purchase program for mercury, 125,000 flasks to be bought from U. S. producers and 75,000 flasks from Mexican mines, all at a ceiling price of $225 per bottle. ODM is expected to issue further directives in the near future calling for the procurement of additional strategic and critical metals and minerals. This action will come when the added funds are made available.

On Capitol Hill another development has occurred dealing with stockpiling. Senator Langer (Rep., N. D.) has introduced a measure which would amend the Stockpiling Act to permit conversion of any materials in the stockpile by their exchange or sale and the application of the exchange allowance or proceeds of sale payment for the acquisition of similar material in the forms desired for stockpiling. The bill would also provide that "no such exchange shall result in the reduction of the quantity of any such material in the stockpiles, except to the extent of any excess above the authorized stockpile objective for such material." No hearings have been held on the measure but it has been considered by the Senate Judiciary Committee in executive session and an attempt made to place it before the Senate. This move was objected to by Senator McCarran and the bill still remains in committee. There is a feeling that its enactment might open the way for disposal of some of the materials in the stockpile without resort to the safeguards that exist in the present law.

Mining Law Revision

Both Senate and House Interior Committees have reported measures to their respective Houses which would permit multiple mineral development of the same tracts of land, and provide a means for resolving conflicts between mining locations and mineral leases on the public domain. The bills would also make it clear that mining locations may be based on discovery of fissionable materials thus removing a cloud on the title to many mining claims resulting from the reservation of such materials to the Government under the Atomic Energy Act.

The measures drew the strong support of the mining and oil industries as well as the Atomic Energy Commission and the Interior Department. The final version of the bill will be the result of floor and conference action. It is expected that Congress will approve the legislation before it adjourns.

Another measure, passed by the House and now pending on the Senate calendar, would permit mining locations on lands withdrawn for power development or power sites. Senator Anderson (Dem., N. M.) has indicated that when the bill comes up for debate he will seek to amend it to provide for a separation of the surface from subsurface rights on mining claims on power sites within national forests, and to reserve to the United States all timber on the claims even when they go to patent. Strong opposition to these proposals exists in the Senate and among mining state Representatives in the House.

New Tax Law

On July 2, after lengthy debate during which proposals to cut personal income taxes were defeated and the dividend relief provisions were eliminated, the Senate passed the Administration's tax revision bill and sent it to conference with the House. The final version of the measure will be written by the conference committee.

During the floor debate in the Senate attempts were made to reduce the depletion allowance for oil and gas from 27½ percent to 15 percent but proponents of this move could not muster enough votes to force a roll call. The Senate wrote into its version a 23 percent depletion allowance for some 30 strategic and critical minerals, increased the allowances for certain others to 15 percent, liberalized depreciation provisions, hiked the exploration allowance ceiling from $75,000 to $100,000, and made a number of other technical changes which will benefit the mining industry.

AMC Personals

Harlan A. Walker has recently been elected an associate director of the National Mining and Petroleum Society of Peru.

Stanley B. Johnson, Jr. was elected president of the Lorado Coal Mining Co. at the annual shareholders and directors meetings held June 14. He succeeds **Stanley B. Johnson,** who was named chairman of the board.

Johnson, Jr., received his education at the Columbus Academy, Columbus, Ohio; Lawrenceville School, Lawrenceville, N. J., and Wesleyan University, Middletown, Conn. He has been active in the company's mining operations for the past 16 years beginning his career in 1938 at the Lorado mines in Logan County, W. Va. In 1947 he was transferred to the company's mining operations in Belmont County, Ohio. Three years later he returned to Lorado where he remained until 1952 when he moved to Columbus, Ohio, as assistant to the president.

S. B. Johnson, Jr.

Stockholders of Kennecott Copper Corp. at the recent annual meeting acted to extend the tenure of **Charles R. Cox,** president, until he is 70 years old. Cox, 63, ordinarily would be eligible for retirement at 65, according to Kennecott officials.

Word has been received that **B. E. Schonthal,** secretary-treasurer of the Illinois Mining Institute, for 25 years, is retiring because of ill health.

Howe Sound Co. has announced several personnel changes within various subsidiaries of the company. **J. S. Roper** has been appointed manager of the Howe Sound Co. Chelan Division, Holden, Wash. He was formerly mine superintendent of Howe Sound Exploration Co., Ltd., Snow Lake, Manitoba.

George Durham has been promoted from mine engineer to mine superintendent at Howe Sound Exploration Co., Ltd. **K. J. Kutz,** formerly mine engineer at Britannia Mining and Smelting Co., has been appointed chief engineer at Howe Sound Exploration Co., Ltd.

J. A. Hunt has succeeded the late L. Ebersole Gaines as president of the New River Co. one of southern West Virginia's largest coal producers.

Hunt, affiliated with the New River Co. for 13 years, joined the firm as vice-president in charge of operations. In 1951 he was promoted to executive vice-president, a position he held at the time of his recent move.

Dr. James Donald Forrester has been appointed dean of the University of Idaho's College of Mines and director of the Idaho Bureau of Mines and Geology. Since 1944, Forrester has been chairman of the Department of Mining and Engineering of the Missouri School of Mines and Metallurgy at Rolla, Mo. He succeeds Dean **A. W. Fahrenwald.**

Oscar E. Carlin has been elected president of the Sugar Creek Coal and Mining Co. and the Millfield Coal and Mining Co. He has been vice-president of both corporations for some years.

J. P. Pollock is now chief geologist of Calumet & Hecla Inc. He succeeds **Dr. Thomas M. Broderick** who retired June 1 after 34 years with the company.

Before joining Calumet & Hecla last year Pollock served with the U. S. Geological Survey in 1940 as an exploration geologist in the Southwest and in Peru with the American Smelting and Refining Co. from 1941 to 1953.

W. H. Moore, formerly superintendent of Glen Lyon colliery, has been appointed general superintendent of mines for the Susquehanna Collieries Co.

Several promotions have been made recently at the Carlsbad, N. M. plant of the International Minerals and Chemical Corp.'s potash division. **Merton I. Signer** was advanced from geologist to mining engineer; **Howard J. Husing** was named mine surveyor; **Robert H. Lane** was promoted to geologist, and **Adolph V. Mitterer, Jr.** joined the company in the capacity of junior engineer.

White Pine Copper Co., subsidiary of Copper Range Co., announces the election by the board of directors of **H. Dodge Freeman** to vice-president; **Donald E. Moulds,** general manager of the mining division of Copper Range Co., to vice-president, and **William P. Nicholls** to secretary.

Freeman, who will be located at White Pine, Mich., where construction of the White Pine Mine project is nearing completion, joins the White Pine Copper Co. organization following 12 years with the Peabody Coal Co.

Thomas I. Shearin has resigned as chief accountant of the Vesta-Shannopin Coal Division of Jones & Laughlin Steel Corp., after completing 28 years of service.

Robert Henderson, former general superintendent of the **Climax Molybdenum Co.** operation at Climax, Colo., has been appointed to the position of resident manager, according to an announcement by Frank Coolbaugh, vice-president in charge of Western Operations.

Robert Henderson

Henderson was employed by the International Nickel Co. in Canada prior to his coming to Climax in 1936. In 1948 he left Climax to become project superintendent for the E. J. Longyear Co. in Illinois. In January, 1952 he returned to Climax as general superintendent.

Other recent appointments in the Climax operation include **Edwin Eisenach** to the post of assistant general superintendent and **William Wilson** to the position of company controller.

Chilton Hernshaw Coal Co., which operates in Logan County, W. Va., has announced the appointment of **John W. Griffith** as its new general superintendent.

F. G. McCutcheon has been appointed technical director of the Eagle-Picher Co.'s mining and smelting division at Miami, Okla. Since 1944 McCutcheon has been manager of Eagle-Picher's smelter at Henryetta, Okla. He will be succeeded by **Charles Condren,** former acting plant superintendent.

David Newby, former superintendent of the germanium operations at Henryetta, succeeds Condren as acting plant superintendent. **Jack Gumm,** chief chemist, succeeds Newby. Also announced was the appointment of **George Komadina** as the division's chief ore dressing metallurgist.

James W. Morgan, president of Ayrshire Collieries Corp. of Indianapolis, Ind., and **Robert L. Hair,** superintendent of fuel mines of The Colorado Fuel and Iron Corp., Pueblo, Colo., are new members of the Board of Directors of Bituminous Coal Research, Inc.

Robert I. Clevenstine, former mine engineer of the Wisconsin District lead-zinc operations, Calumet & Hecla, Inc., has been succeeded in that post by **Harold A. Wisco.** Clevenstine has moved to Grand Junction, Colo., with C & H operations in that area.

Joe Guiton has been made superintendent of Little Sister Coal Corp. at St. David, Ill. He succeeds Tom Pearson, who died recently. Guiton previously was mine engineer of Little Sister.

R. R. Weideman has been named mine manager and superintendent for Inspiration Lead Co. He was mine manager for Silver Dollar Mining Co. from 1946 until recently. Inspiration Lead is carrying on its exploration and development work in properties near Wallace, Idaho and Troy, Mont.

Francis Corrigan of Locust Dale, Pa., is the winner of the Ralph E. Taggart Memorial Scholarship in Mining Engineering. **Edward G. Fox,** president of The Philadelphia and Reading Coal and Iron Co., which annually donates the scholarship in memory of Mr. Taggart, former P & R president, said the scholarship was presented to Corrigan at his high school commencement in Aristes, Pa.

Several new officers have been elected to posts for the International Nickel Co., Inc. **Henry S. Wingate,** vice-president and a director, has been elected president of The International Nickel Co. of Canada, Ltd. Wingate was also elected to the executive committee of the company and to the presidency of its United States subsidiary, The International Nickel Co., Inc. At the same time **F. M. A. Noblet,** assistant treasurer, was elected treasurer of both the companies.

Wingate succeeds Dr. **Paul D. Merica** and Noblet succeeds **William J. Hutchinson,** both of whom have reached retirement age.

In addition, **Ralph D. Parker** was elected general manager of Canadian Operations and **Walter C. Kerrigan** made assistant to the president of the U. S. subsidiary. **Herbert G. Fales** was appointed assistant to the chairman of the board for both companies.

Several personnel changes in Eastern Gas and Fuel Associates' Accident Prevention Department at its southern West Virginia mines have been announced. **Charles K. Parker,** formerly general safety inspector for the Beckley area mines, has been transferred to Keystone as plant safety inspector. He succeeds **Guy D. Wilson,** who resigned to accept a position with another concern.

R. J. Marrs, general safety inspector, will include in his inspection territory the Keystone Kopperston No. 1, Kopperston No. 2, Wharton No. 1, and Wharton No. 2 mines.

G. D. Holmes, general safety inspector, has been assigned to Morris Creek, Beard's Fork, Page, Eccles No. 6, Stotesbury No. 8 and Statesbury No. 11 mines.

I. S. Tillotson, mining superintendent of the Florida Phosphate Department, International Minerals and Chemical Corp., has been named property superintendent for the department. **M. T. Smith,** formerly mining engineer, succeeds Tillotson as mining superintendent.

Prof. George B. Clark of the University of Illinois has been appointed professor of Mining Engineering and Chairman of the Department of Mining Engineering at the University of Missouri School of Mines and Metallurgy.

G. B. Clark

Prof. Clark, whose appointment was recently approved by the Board of Curators, will begin his duties September 1. He succeeds **Dr. J. D. Forrester,** who recently accepted the deanship of the School of Mines of the University of Idaho.

Frank H. MacPherson was recently appointed general manager of the Dulaney Mining Co. with offices in the First National Bank Bldg., Grand Junction, Colo. He was formerly director, Production Division, Grand Junction Operations Office, U. S. Atomic Energy Commission.

John L. G. Weysser, consulting mining engineer, of Pottsville, Pa., recently completed an engagement in Korea as consultant to the United Nations Korean Reconstruction Agency on its program to increase production from the coal mines. He is now examining some mines in Japan.

Victor A. Zandon has been appointed refinery superintendent for the Southwest Potash Corp. plant in Eddy County, N. M., succeeding **R. M. Durland, resigned.** Before his appointment with Southwest, Zandon was engaged in setting up the milling process for the White Pine Copper project in Michigan.

F. G. Frey has been named vice-president in charge of sales for the Susquehanna Collieries Division of The M. A. Hanna Co., according to an announcement made by C. A. Gibbons, president of the Division.

Several changes have been made in personnel of the United States Smelting Refining & Mining Co.

George Mixter, formerly executive vice-president, retired under the terms of the company's retirement plan. He continues as a director and member of the executive committee. **J. George Gange,** former vice-president and comptroller, was elected administrative vice-president. **Frank F. Benson,** formerly assistant comptroller, was appointed comptroller. **James R. Sharkey** was appointed assistant comptroller and **Hollis G. Peacock** was appointed assistant to the president.

— *Obituaries* —

John F. Foreman, 67, superintendent of the Argyle Coal Co., Gallitzin, Pa., died May 30. Before becoming associated with the Argyle Coal Co., Mr. Foreman served in a similar capacity with the Sterling Coal Mining Co. at Bakerton, Pa., and was a member of the firm of Joseph Silliman and Son, civil and mining engineers, Altoona, Pa.

Homer A. Harris, 70, widely known mining executive, died in Denver, Colo., June 1. At one time, Mr. Harris was vice-president of the Potash Co. of America. He had been a director of that company since 1931.

Donald C. Leo, 51, secretary and general attorney of Universal Atlas Cement Co., a subsidiary of U. S. Steel Corp., died of a heart attack May 22 at his home in Huntington Station, L. I.

Mr. Leo, after several years of association in legal capacities with New York firms and operation of his own law office, joined the cement company as an attorney in 1943. He was appointed assistant secretary of the company in 1947, was elected secretary in 1951 and general attorney in 1953.

John E. Kelley, 58, well-known consulting mining engineer, died unexpectedly of a heart attack June 18 in Washington, D. C. A native of Fitchfield, Mass., Mr. Kelley was a graduate of Rensselaer Polytechnic Institute and the University of Mexico. He served in World War II as a major with the Central Intelligence Agency.

As a mining engineer, Mr. Kelley traveled and worked in Central America, Venezuela and Spain. He recently was awarded the Spanish Grand Cross of Isabel la Católica for his work in that country.

NEWS and VIEWS

Eastern and Central states

Honor Coal Men

Two men well known to the mining industry were recently honored by The Pennsylvania State University when they were awarded the "Distinguished Alumnus Award." Jesse B. Warriner, senior director of the Lehigh Coal and Navigation Co., and Paul Weir, chairman of the board of Paul Weir Co., Inc., received the awards on June 12. Both were conferred by Dr. Milton S. Eisenhower, president of the university.

J. B. Warriner

Paul Weir

Mr. Warriner's citation read in part, "The particular genius of Jesse B. Warriner has been his ability to assume leadership with quiet determination. . . . Mr. Warriner has used his talents so wisely in the anthracite coal industry that he has made his mark as a successful industrialist, a fair-minded conciliator, and a good citizen."

The citation of Mr. Weir read in part, "His name today is familiar and important to producers, distributors, and large users of coal and other minerals all over America and in many other parts of the world. This is because Paul Weir persevered to get an education, learned his business the hard way, and used his knowledge and experience for the benefit of the vital mineral industries."

Bureau Occupies New Quarters

Plans are being made by the U. S. Bureau of Mines to occupy the new Morgantown, W. Va., Experiment Station immediately.

The station will accommodate: (1) laboratory and pilot equipment and personnel engaged in research on the part of the Bureau's synthetic liquid fuels program which deals with experimental production of synthesis gas; (2) laboratory equipment and personnel engaged in petroleum and natural gas research in the Appalachian region; and (3) district headquarters for mining studies and health and safety work. All these activities are currently being carried on in other quarters.

New Titanium Producer

A Canadian company, the Shawinigan Water and Power Co., reported recently that it had found a way to produce titanium at lower cost than now prevalent. According to reports, the titanium is produced by an electrolytic process. The company plans to go into production.

Conveyor for Cement Co.

Hewitt-Robins Incorporated, has been awarded a contract to build a belt conveyor system approximately one mile long at the Alpha Portland Cement Co. plant, Catskill, N. Y. It will carry limestone at the rate of 300 tph from the screening station to the storage area where the limestone is crushed, and will cross Highway 9-W and the West Shore Railway on special overhead galleries. The new belt conveyor will replace an aerial tramway that has been in operation for a number of years.

End Marketing Contract

Glen Alden Coal Co. and the Moffat Coal Co. have terminated, by mutual agreement, their contract providing for the marketing of Moffat production exclusively by Glen Alden.

In announcing this separation of marketing activities, the managements of both companies stressed that the action was entirely friendly and prompted by mutual considerations.

It was emphasized that the termination of the marketing contract, a carry-over from the time when Glen Alden leased its Lackawanna properties to Moffat, in no way affects the sale, last July, of those properties to Moffat Coal.

British Try New Type Loco

A number of experiments are being made in Britain with new types of locomotives for underground haulage. So far as novel developments are concerned, the electrogyro locomotive is described as the most interesting possibility in this field. The equipment comprises a large fly-wheel which incorporates a change pole squirrel cage motor. The fly-wheel is brought up to speed by coupling its motor to an electric supply outlet, conveniently located.

The gyro motor then acts as a generator using energy stored in the wheel and supplies power to traction motors until the lowering of the flywheel's speed necessitates re-speeding.

The National Coal Board has decided to try out a locomotive of this kind on the surface for switching service. This experiment might pave the way for underground use.

AEC Reorganizes New York Office

K. D. Nichols, general manager of the U. S. Atomic Energy Commission announced the AEC has approved transfer of the feed materials production responsibilities of its New York office to the Oak Ridge Operations Office effective July 1, 1954.

The Commission will maintain a New York office to supervise the Health and Safety Laboratory at 70 Columbus Ave., New York; about 275 research and development contracts chiefly at universities and laboratories; and the Brookhaven National Laboratory at Upton, N. Y.

Nichols said the consolidation of these production functions under Oak Ridge is designed to achieve greater efficiency and economy in the national atomic energy program.

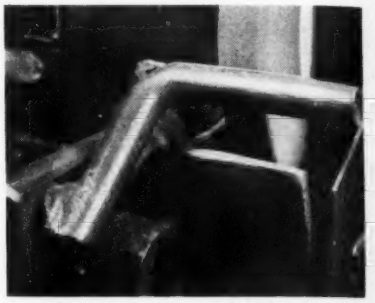
Grinding Tools

(Continued from page 51)

This means higher cutting efficiency results with lower power consumption per ton of coal produced.

According to Carboloy engineers, dry grinding is generally preferred when resharpening tools. Advantages include more uniform tip temperatures, better visibility while grinding, longer tool and wheel life due to better control of cutting action.

Incidentally, an adequate ventilating system should be used whenever possible to help carry away the highly



A steady tool rest can be easily made by welding steel bar stock to extension of pedestal grinder

abrasive dust generated during maintenance operations.

To reduce heat, and lengthen tool and wheel life while grinding, keep the tools in motion. A side-to-side, up-and-down and rocking or rolling motion can be used, depending on the type and style of tool being resharpened.

While cemented carbide is many times harder than steel, it does not have the same thermal characteristics. Therefore do not quench. Quenching carbide tools in water immediately after grinding is asking for trouble. The thermal strains set up between the brazed steel and carbide, when the tool is suddenly cooled may damage the carbide tip.

Coal Fellowship

A coal research Fellowship has been initiated at Mellon Institute, Pittsburgh, Pa., by Bituminous Coal Research, Inc., according to an announcement by E. R. Weidlein, president of Mellon Institute, and A. A. Potter, president of the sponsoring organization.

The scope of the new Fellowship will include problems connected with the mining, preparation, transportation, and utilization of bituminous coal and some of its primary products. It will emphasize laboratory research on chemical and process uses of coal and these primary products.

Dr. Richard A. Glenn will head the new Bituminous Coal Fellowship.

Marquette Improvements

Marquette Cement Manufacturing Co. has announced a long-range expansion and improvement program for its recently acquired Superior, Ohio, cement plant and limestone quarry. Immediate plans call for improvement and remodeling of present plant facilities and a complete overhaul of all present machinery, mills and other equipment. The present quarrying operations will be changed to open pit mining. A new modern crushing plant consisting of three units will also be constructed.

The change-over in the quarrying operations is expected to be completed by late this summer and the new crushing plant will be in operation by mid-1955. In the future, the limestone will be stripped by a walking dragline having 140-ft boom. An 1800-ft belt conveyor will connect the three-unit crusher plant with the cement plant.

The atomic plant currently under way in White County, Ohio, and other industrial developments in surrounding areas reportedly were largely responsible for the decision to expand the Superior operations.

"Sentinels of Safety" Awards

Winners of "Sentinels of Safety" trophies awarded each year to the six mines and quarries with the best safety records in their respective groups of the annual National Safety Competition of the Bureau of Mines, have been announced by Secretary of the Interior Douglas McKay.

The 583 mines and quarries in 41 States that competed in 1953 attained the best safety record since the competition was inaugurated in 1925.

The trophy winners:

Anthracite mines (underground): Coal Brook Colliery, The Hudson Coal Co., Carbondale, Pa., which worked 209,088 man-hours with four lost-time injuries causing an aggregate loss of 44 days;

Bituminous-coal mines (underground): Hanna No. 4-A mine, The Union Pacific Coal Co., Hanna, Wyo., which worked 374,702 man-hours without a lost-time injury;

Metal mines (underground): Calloway-Mary mine, Tennessee Copper Co., Ducktown, Tenn., which worked 145,088 man-hours without a lost-time injury;

Nonmetallic mines (nderground): Annandale limestone mine, Michigan Limestone Division, United States Steel Corp., Boyers, Pa., which worked 896,629 man-hours without a lost-time injury;

Open-pit mines: Mahoning mine, Pickands Mather & Co., (Mahoning Ore & Steel Co.), Hibbing, Minn., which worked 773,666 man-hours without a lost-time injury; and

Quarries: Alpena limestone quarry, Wyandotte Chemicals Co., Alpena, Mich., which worked 459,668 man-hours without a lost-time injury.

Besides a bronze trophy, each winner will receive a "Sentinels of Safety" flag in the traditional safety colors—green and white—both donated by the *Explosive Engineer.* Winners will retain the trophy and flag for a year, after which they are to be returned for presentation to the 1954 winners. Each employe of a winning mine receives a Certificate of Accomplishment in Safety.

The Bureau also will award Certificates of Achievement in Safety to 154 competing mines and quarries—the four runners-up in each group, plus all other injury-free contestants working at least 30,000 man-hours during the year.

Including five of the trophy winners, 197 competing mines and quarries had perfect safety records. However, 42 of these worked less than 30,000 man-hours and so were ineligible for certificates.

The injury-severity rate of all competing operations last year was 4.039 days lost per thousand man-hours and the injury-frequency rate was 22.220 per million man-hours. The 29-year average severity and frequency rates of mines and quarries entered in the competition are 7.862 and 44.956 respectively.

Reopen Amigo

The Amigo Smokeless Coal Co. mine at Amigo, W. Va., has been reopened after being closed since January 7. At that time the mining equipment was withdrawn and the mine completely shut down because of depressed market conditions.

Search for Copper Uses

The copper and brass mill industry, with the cooperation and support of leading copper mining companies has embarked on an increased research and promotion program.

Primary purpose of this program will be to develop through research maximum utilization of copper in many new modern applications. As part of this program, the vital role of copper and its alloys in vitrtually every phase of modern science and industry will be emphasized.

Because of the increasing availability of copper and its products and the ample capacity of the copper and brass mills to meet all requirements, it is possible now to engage in this program of active promotion. The fabricating capacity of the industry has been and is being increased substantially both by additional facilities and improved methods.

Southern Appalachian Industrial Exhibit

Bituminous coal took the spotlight May 26-28 in Bluefield, W. Va., as manufacturers unveiled the latest developments in machinery, tools and supplies to the mining industry at the 1954 Southern Appalachian Industrial Exhibit. The show is sponsored by Pocahontas Electrical and Mechanical Institute in cooperation with coal, railroad, wholesale and other industrial interests.

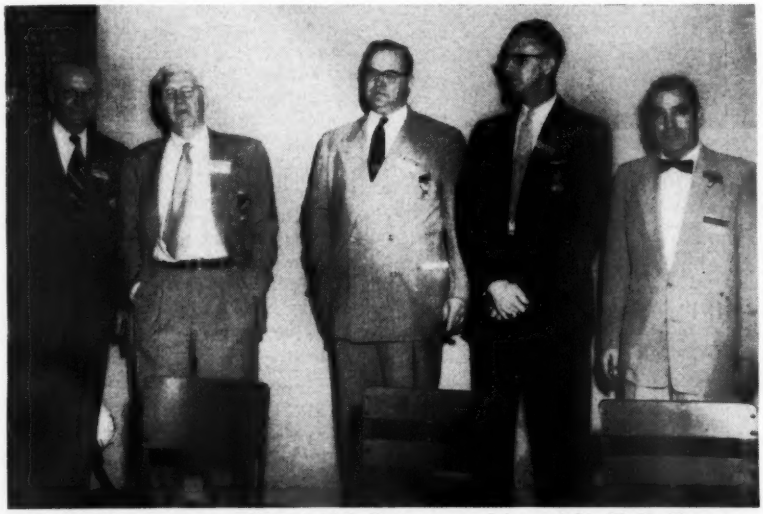
One of the big attractions at these affairs is the "Gadget Contest." Here gadgets invented or developed by coal miners are displayed. First prize this year went to C. J. Bonham, chief electrician for the Winding Gulf Collieries' Good Will Mine, who displayed a "slide kicker" which eliminates stopping loaded coal trips to remove the braking slides by hand. Second prize went to Bernard McCall, of Mecca Coal Co., who developed a bottom coal drill for one-man operation. C. R. Wilson, Mountain States Coal Co., took third prize for his safety hook for mine car coupling pins. Fifteen devices were entered in the contest.

Perhaps the greatest single attraction at the show was the Pioneer Miners' Club reunion held on the final day. Although the ranks were thinned somewhat from the last biennial reunion, 200 coal mining veterans gathered to hear expressions of confidence in the future of the bituminous coal industry.

Two Pocahontas, Va., mining veterans claimed the top prize for having the best safety record. Charles Harris, 80, was cited for working 66 years, from 1886 to December 1, 1952, without a single lost-time accident. The second longest record recognized was that of 80-year-old Charles Thomas Davis who labored 61 years in the mines without a lost-time accident. The two oldest ex-miners present were Norman Twigg, 87, Pocahontas, Va., and J. R. Roland, 83, Eda, W. Va., both of whom were awarded prizes also.

During the speaking program, the Pioneer Miners were addressed by M. D. Cooper, director of Mining Education, National Coal Association; R. M. Lambie, formerly head of the West Virginia Department of Mines and now consultant to Mine Safety Appliances Co.; Joseph Moody, president, Southern Coal Producers Association; Frank B. King, chief, West Virginia Department of Mines; and Jack Pero, chairman of the Pioneer Miners' Union.

A tribute was paid to the late Fred J. Bailey, who served as chairman of the Pioneers' Club for many years and who helped the membership grow to the more than 575 men now on its rolls.



Addressing the Pioneer Miners' Club Union were: left to right, M. D. Cooper, R. M. Lambie, Joseph Moody, Mike King and Jack Pero

Charles Harris (second from left) with 66 accident-free working years, and Charles Thomas Davis (third from left) with 61 years with no lost time from accidents, awarded prizes for the best records for accident-free service in the coal mining industry. Queen Bituminous 12, Ann Francisco, made the award. Jack Pero, Pioneer Miners' Club Union Chairman, is shown standing behind Davis. Attendants to Queen Bitumious 12 are shown on the right. They are Laura Blankenship, Iris Sykes and Betty Lou Dotson

Willow Grove Worked Out

Pittsburgh Consolidation Coal Co. has announced that it will close its Willow Grove Mine near Neffs, Ohio, because the coal in the mine that can be reached economically is near exhaustion. Operated by the Hanna Coal Co. Division of Pittsburgh Consol., the mine last year produced about 638,000 tons of coal.

Humphrey Floated

A new iron ore carrier, the *George M. Humphrey*, will be floated from drydock in the Lorain, Ohio yards of the American Shipbuilding Co. in July and will enter service during the current season. Built for National Steel Corp., the cargo capacity will be 21,000 tons at 24-ft draft. The ship's length will be 710 ft. It has a beam of 75 ft, a molded depth of 37 ft, 6 in., and is driven by an 8500-hp unit.

With the addition of the new ship, the National Steel fleet, operated by the M. A. Hanna Co., will have the two highest capacity carriers on the Great Lakes. The fleet's flagship, the *Ernest T. Weir*, has a slightly smaller capacity than the *Humphrey*. However, during the 1953 ore-carrying season, the *Weir* carried the largest cargo of iron ore in the history of the Great Lakes.

Roof-Bolt Anchorage Tests

Methods and apparatus developed by the Bureau of Mines to determine whether slotted-type roof bolts are satisfactorily anchored in sandstone or shale mine roof are the subject of a report released recently.

The report describes a cooperative investigation conducted at the Dehue, W. Va., mine of the Youngstown Mines Corp. Using special equipment and test procedures, the Bureau was able to measure anchor slip, or displacement, for loads up to the yield point of two representative makes of slotted-type roof bolts.

According to the report, the tests showed that slotted-type roof bolts can be installed in either shale or sandstone so as to remain firmly anchored under loads up to their yield points. The Bureau found also that the shape of the slotted end of the bolt affects the ease with which it can be driven into rock, and that the distance a bolt is driven can be used as a criterion for satisfactory anchorage.

The report was prepared by A. J. Barry, chief, and L. A. Panek and John A. McCormick, mining engineers, of the Coal Mining Research Section, Applied Physics Branch, at the Bureau of Mines Eastern Experiment Station, College Park, Md.

A free copy of Report of Investigations 5040, "Anchorage Testing of Mine-Roof Bolts; Part 1, Slotted-Type Bolts," can be obtained from the Bureau of Mines, Publications Distribution Section, 4800 Forbes Street, Pittsburgh 13. It should be identified by number and title.

Georgia Uranium Find

Uranium has been discovered in a mica mine near Barnesville, Ga. Although it is not known whether the ore is of commercial value at this time, it is reportedly the best showing of uranium ever found in Georgia. Geologists have expected and looked for uranium deposits in Georgia mica for quite some time. Most of the prospecting, however, have been further south than the discovery near Barnesville.

Prestressed Concrete

(Continued from page 35)

constructed in the pretensioning plant of the Southwest Structural Concrete Corp. of San Diego. In the pretensioning plant, the prestressing wires are tensioned between two heavy abutments, the forms set in place, and the concrete cast. After the concrete gains sufficient strength (it is steam cured), the wires are cut and the beams are stockpiled ready for shipment to the job site. A special type of end anchorage is used, called the Dorland Clip Anchorage, which allows the use of larger wire (⅜-in. diam) than can be used when only bond between the concrete and the wire is relied upon to hold the prestressing force. Also, since the clip anchorage can be placed at any location along the wire, the prestressing force can be varied throughout the length of the beam. From an economy standpoint this is a very important development in the practical design of pretensioned prestressed members.

Prestressed concrete has been used for a number of specialized concrete products including railroad ties, fence posts, telephone poles, and tanks.

As engineers and builders gain in experience and develop better design and construction techniques, and the volume of specialized materials used for prestressed concrete is increased, the over-all cost of prestressed concrete structures will be further reduced and the cost gap between "conventional" construction and prestressed concrete construction will become even more favorable for prestressed concrete.

Haile Mines Outline Progress

In a letter to stockholders of Haile Mines, Inc., Hewitt S. West, president, says construction of a new chemical plant to treat secondary material is planned at the company's tungsten mine in North Carolina. The unit is expected to go into operation early in 1955.

West went on to say that Manganese, Inc., a partially owned subsidiary, has continued production while numerous alterations and minor alterations in the calcining and nodulizing flow sheet were carried out. These changes are improving operations, and it is expected that production will be stepped up within the very near future.

Belt for White Pine

Nearly four miles of conveyor belting have been shipped to the White Pine Copper Co. at White Pine, Mich. It took eight railroad cars to ship the belting, which weighed a total of 115 tons in 44 sections. Much of the belt will be used to carry copper ore out of the mine and from the mouth of the mine to a crushing plant. Other sections will be used in the mine's processing plant.

DMEA Contracts

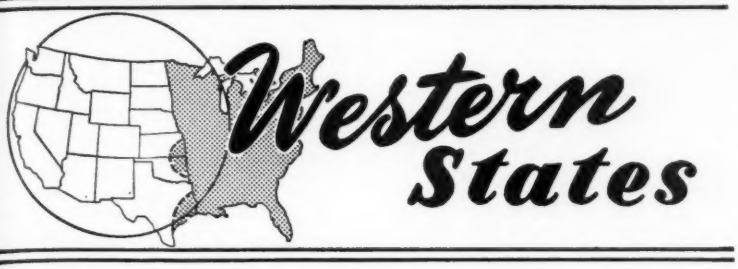
In the five-month period ended April 30, 117 new applications for Government assistance in the exploration for strategic minerals were received by the Defense Minerals Exploration Administration.

The new applications propose projects involving exploration for 18 commodities in 19 states and Alaska. Total estimated project cost as set forth in 110 of these applications was $4,402,000—seven of the applicants stating those specific amounts. Largest of the new applicants was for a $546,000 lead-zinc exploration program in Idaho, and the smallest calls for a $715 beryl project in Maine.

During April 37 applications were received, making it the highest month for new filings since June 1953.

In the same five-month period, 31 contracts providing for exploration for 11 mineral commodities in as many states were executed. Estimated project cost of these contracts is $1,420,432 with a maximum Government participation of $939,555.

Since the inception of the program, 637 contracts have been entered into by the Government calling for more than $30,000,000 of exploration work.



Copper Cities Progress

Miami Copper Co.'s new mine, Copper Cities Mining Co. in Arizona, is expected to start production some time in August, roughly five or six months ahead of original estimates. The Copper Cities property is being equipped with plants and facilities of the firm's near-by Castle Dome mine which was shut down in December last year because the ore had been exhausted. Castle Dome had been accounting for about half of Miami's copper output.

Four of the seven units in the copper concentrator at Copper Cities will start production in August. The remaining three will follow in the next few months. Copper in refined, marketable form will be coming out around the beginning of December this year.

Treat Placer Material

Gibbonsville Mining and Exploration Co., is now handling about 400 tpd of placer material in its new flotation plant, west of Kellogg, Idaho. The area being worked formerly was a settling basin for mill tailings washed down the South Fork of the Coeur d'Alene River from the Wallace-Burke district.

Uranium Mill for Moab

Utex Exploration Co., headed by Charles A. Steen, and Edward H. Snyder of Combined Metals Reduction Co. have joined resources in forming a new corporation to build a uranium processing mill at Moab, Utah. The new firm is Uranium Reduction Co., a Nevada corporation.

Start of the project is dependent on approval of the mill by the Atomic Energy Commission, said Steen, Utex president. He added that negotiations with the A.E.C. will start immediately and that the companies expect no difficulties in obtaining the approval. Plans are to build a concentrator that will serve "independent" operations in the uranium fields of Utah and Colorado. Construction will be started this fall, with completion of the mill expected early in 1956. Site of the mill will be adjacent to the ore sampling and buying depot presently under construction by the A.E.C.

Uranium Reduction will construct the concentrator and will also operate the mill. The facility is fully financed according to Steen, and design is well along. He predicted that it will be the largest and most modern on the Colorado Plateau. Edward H. Snyder brings to Uranium Reduction a long history of experience and sound management, according to Steen. Their "know how" combined with the tremendous orebody controlled by Utex, should assure a large operation beneficial to the Big Indian Wash area, the Colorado Plateau and the U. S., in general, according to Steen. The entire output of Utex's MiVida mine has been pledged to the new mill.

Idaho Goldfield Sinks Stope

An incline shaft is under construction at the Idaho Goldfields, Inc., property 52 miles east of Spokane, Wash. The shaft is being sunk on an ore shoot at the portal of exploration tunnel driven by the firm. Current work has disclosed that the ore shoot has a different dip than indicated by winze work done previously. The shaft is following the ore downward.

Open Rhyolite Deposit

William Higdon and Lester Spell have opened a rhyolite deposit 16 miles east of Twenty-Nine Palms, Calif., and have installed a hoist and highline. Architects and builders are using the material mainly for fireplaces and patios. Higdon reports the rock runs 180 lb to the cu ft and breaks and polishes well.

Option Alaskan Claims

Additional interest has been expressed in the highly mineralized region north of Hyder, Alaska.

According to an Alaskan Department of Mines Bulletin, British Columbia interests have taken an option on 27 claims in the Upper Texas Creek area. These claims, which are known to contain gold, silver, copper, lead, manganese and molybdenum, include the old Ibex, Snowshoe, Sunset, Morning and Blasher extension groups. R. S. Douglas is reported to be the engineer for the new company, the Douglas Mining and Development Co., Ltd., of Vancouver, B. C., which will develop the properties.

Silver Bell in Production

Full-scale production of copper ore has been started by the American Smelting and Refining Co. at its Silver Bell Unit, 40 miles northwest of Tuscon, Ariz.

The company expects to mine approximately 7500 tons of ore daily, with a monthly output of 1500 tons of refined metal. The ore body is estimated to contain approximately 0.9 percent copper, and at the proposed rate of production will have a life of 11 to 12 years.

The entire project has been company financed with government assistance limited to rapid amortization of the investment for tax purposes and a price guarantee ending in 5½ years. Stripping of the ore body started in December 1951.

The Silver Bell Unit consists of the Oxide and El Tiro open-pit mines, the former about ½ mile and the latter about three miles from the millsite. Stripping operations were contracted to Isbell Construction Co., the townsite development to Utah Construction Co., and mill erection to Stearns-Roger Manufacturing Co. Concentrates are trucked 20 miles to Plata, a new shipping point on the Southern Pacific, then sent by rail to the El Paso smelter.

Fire Control Project

The Nugget Coal and Timber Co., Denver, Colo., was the low bidder on a fire control project near Rawlins, Wyo. The contract included exploratory drilling, compacted filling and covering the burning coal outcrops some 30 miles north of Rawlins.

Develop Amador

According to J. F. Charlton, president, Amador Mining Co. is just about up to schedule on development work at its Green Mountain property near Dixon, Mont. Plans include sinking the present shaft to 250 ft and in 1954, 200 ft more.

Nickel Refinery Producing

Elden L. Brown, president of Sherritt Gordon Mines Limited, announced at the annual stockholders meeting in Toronto that the gas reform and anhydrous ammonia plants, first units of their new $24,000,000 nickel refinery at Fort Saskatchewan, Alberta, Can., were on stream. They are operating in excess of rated capacity. This huge refinery, the first of its kind in the world, was engineered and is being constructed by Chemical Construction (Inter-American) Limited of Toronto. It embodies a chemical process for extracting and refining nonferrous metals from their ores, thus by-passing conventional and more costly smelting and refining techniques. Natural gas and nickel concentrates are the raw materials for the operation, with high purity nickel, ammonia and ammonium sulphate as finished products. The operation employs processes pioneered jointly by Sherritt Gordon and Chemical Construction Corp.

New Rainbow Progress

By the end of May, the New Rainbow Mining Co. had completed 327 ft of drift work since the first of this year at its Weber property in Bonner County, Idaho. One small ore shoot having lead-zinc and gold-silver values in the old workings was exposed.

Much of the drift progress was retimbering and widening the old openings, driven as much as 40 years ago. In some cases, however, it was necessary to run new headings in order to by-pass badly caved areas.

Plans are to continue the east drift an additional 40 ft to virgin ground and then extend it further along the vein structure in search of the downward extension of the open-pit ore body. It is also planned to extend the west drift to the old workings just ahead and then continue on another 75 ft to connect with other old workings in which one, and possibly two ore shoots are indicated on old maps of the mine.

Unwater Hypotheek Shaft

Plans have been announced by the Hypotheek Mining and Milling Co. to unwater its East Hypotheek shaft near Wallace, Idaho. A 100-ft extension of an old northerly crosscut from the 200-ft level of the shaft would open a vein disclosed by surface bulldozing, according to a letter company management has sent to stockholders.

Map Lignite Reserves

Enough coal to supply the nation for 60 years was recently mapped in Dewey and Carson Counties, South Dakota, by the State Geological Survey according to Dr. E. P. Rothrock, state geologist. These counties have only a small part of the State's potential lignite. Three maps, the first of a set of 33 maps of state coal reserves under way in the state, have been released showing a reserve of 184,000,000 tons.

Back on Six-Day Week

Kennecott Copper Corp.'s mining divisions in Arizona, Nevada, New Mexico, and Utah, which had been operating since Mid-March on a five-day week, returned to a six-day week May 16.

A marked improvement in demand for copper in the second quarter of the year made possible the longer operating week. The company's curtailment of operations in the first quarter prevented an unwieldy accumulation of stocks during the period of low demand.

Mining Activity Under Way

Mining activity has started at the old Polaris mine near Polaris, Mont. Laurence Berry, who has leased the property, has engaged Loren Eberline to operate his bulldozer in an extensive search for good ore at the property.

New Kennecott Department

The establishment of a new engineering department in Salt Lake City for the Western Mining Divisions of Kennecott Copper Corp., and appointment of the first official of the new department, is announced by J. P. Caulfield, general manager of the company's four western divisions.

Alvin J. Thuli, Jr. has been appointed assistant to the chief engineer, Western Mining Divisions. Caulfield said that the chief engineer was yet to be named.

In announcing the new department, Caulfield said that over-all engineering and design work has previously been scattered throughout the four western divisions. The activity will now be centered in Salt Lake City in the new engineering department. He stated that the department would comprise approximately 25 people and that personnel will be recruited as the work gets under way.

Modernize Lost River

New flotation cells have been installed by the United States Tin Corp. at its Lost River Mill in Alaska. It is reported that the equipment will clean 300 tons of concentrate on hand from an earlier operation, in addition to treating current mine and mill production. The operation is presently producing three tons of concentrate daily from 150 tons of ore mined and milled.

A-Ore Plant in Paradox Valley

A uranium or processing plant is being considered for the Paradox Valley of Colorado, according to Sheldon P. Wimpfen, manager of the Grand Junction Operations Office of the Atomic Energy Commission. The plant will process ores from the Monogram Mesa mines, principally the Jo Dandy and Mineral Joe. The AEC's semi-annual report briefly confirmed that a study of the area as a plant site was under way.

Attempts are being made to interest private industry in building and operating the plant, Wimpfen said. The AEC would build it, he added, only if it appeared that industry is reluctant to do so. Substantial ore reserves were found in the Paradox Valley area as a result of extensive drilling of the area by the U. S. Geological Survey for the AEC.

Pacific Coast Sulphur

Production of the first commercial sulphur on the Pacific Coast, which will provide the U. S. West Coast with its closest source of sulphur, began April 1 with the opening of the Texas International Sulphur Co.'s processing plant near San Felipe, Baja California, Mexico, 125 miles south of the United States border.

The plant is the only one on the North American continent now producing crude commercial sulphur from surface ore, Victor Dykes of Houston, president of Texas International announced. Only one other plant has ever produced commercial sulphur from surface ore in North America. This was at San Luis Potosi, in the interior of Mexico, but the plant is not presently in operation.

The plant will extract crude sulphur from the surface ore by the autoclave process.

All this for You,

IN COAL MINE MODERNIZATION, 1954

Here's the year's greatest collection of useful information on methods, operating practices and equipment for efficient coal production and preparation. This handy book is actually the 1954 Coal Convention (Cincinnati, May 3-5) in print—all the papers and discussions, fully illustrated, arranged in an attractive, flexible binding for your convenient study and reference.

Coal Mine Modernization, 1954 is packed with hundreds of bits of information and ideas for the practical mining man.

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Published by **AMERICAN MINING CONGRESS**

RING BUILDING **WASHINGTON 6, D. C.**

Taking time out during a meeting of the Executive Committee of The Tungsten Institute, in Washington, D. C., members examine display of tungsten ores and products. They are K. C. Li, president, Black Rock Mining Co. and chairman, Wah Chang Corp.; Chas. H. Segerstrom, Jr., president, Nevada-Massachusetts Co.; W. Lunsford Long, vice-president and general counsel, Tungsten Mining Corp., and Jas. A. White. Long is president, Segerstrom, vice-president and White, executive secretary of The Tungsten Institute. The executive committee met to complete plans for the annual meeting of the institute, which will be held at the Canterbury Hotel in San Francisco on Tuesday, September 21, during the big American Mining Congress 1954 Metal and Nonmetallic Mining Convention and Exposition

Polaris Cuts Interesting Ore

Polaris Mining Co. has intersected a new ore shoot which is described as "very interesting" on the new 3200-ft level in the Purim area of the silver belt near Kellogg, Idaho. The ore shoot, cut in only one drill hole on the 3000-ft level above, was expanded to 190 ft or more with a very good grade on the 3200-ft level according to reports.

It has been decided to extend the Silver Summit Mine's 3400 level to the new ore shoot rather than to put down an offset winze on the ore.

Washington Company Erects Mill

Spokane Molybdenum Mines, Inc., plans to erect a 25 to 50 tpd concentrator at its property north of Davenport, Wash., according to a company spokesman. There is a considerable amount of molybdenum-gold-silver ore available in an old dump at the site, according to reports, in addition to ore underground.

Announce Scholarships

Four new scholarships have been announced by W. C. Page, vice-president and general manager of western operations, U. S. Smelting Refining and Mining Co., and G. R. Watkins, general manager for U. S. Fuel Co. Three of the scholarships by U. S. Smelting are for the Utah College of Mines and Minerals Industries at the University of Utah, and are open to any graduate of an accredited high school, but sons of company employes whose scholarships records are competitive will be given preference. The awards are known as the Downie D. Muir, Jr., Walter H. Eardley and Edward A. Hamilton scholarships. A four-year coal mining engineering scholarship to the University of Utah with the option of the first two years at Carbon College, was announced by U. S. Fuel Co.

Buy Oil Shale Land

Dow Chemical Co. recently acquired 85 per cent of the stock of Columbia Oil Shale Refining Co. of Colorado. According to reports, Dow has no immediate plans to develop the 7600 acres of oil shale land owned by Columbia Oil, but acquired them as a part of a long-range program to assure adequate raw materials.

Test Tungsten Ore

The Bureau of Mines has reported its test in the laboratory at Albany, Ore., has shown that acceptable tungsten concentrates can be produced from low-grade ferberite-scheelite ore from Stevens County, Wash. The tests were made on ore from the Germania Consolidated Mines, Inc. property near Fruitland, Wash.

Manganese-Iron Found In S. D.

The discovery of a manganese-iron ore in the Fort Pierre area of South Dakota may lead to the development of at least a small-scale operation. Discovery of the deposits in the Antelope Creek Valley on a ranch south of Fort Pierre was revealed recently by Robert H. Miller, research director of Natural Resources Commission.

Arizona Uranium Finds

Two Los Angeles firms have reported the discovery of uranium ore in widely separated portions of Arizona. M. S. Development and Exploration Co. claims to have obtained copper-uranium ores from the old Copper House district in Mohave County. McCary-Beacom Co. reports a find in Marble Canyon, Ariz., on the fringe of the Four Corners area. The deposit is reported occurring in the Shinarump conglomerate.

Gold Operator Extends Work

The Magalia Mining Co. is planning to extend its underground workings to the Mammoth Channel at its mine near Magalia, Calif. The company has recently completed a ventilation hole 16 in. in diam drilled from the surface to a depth of 940 ft. The company is one of the few drift mines now operated in California. It produces free gold from ancient gold-bearing channels buried by recent lava flows.

Restore Land to Public Domain

A Public Land Order has been signed by the U. S. Government opening 192,000 acres to mineral leasing in the Matanuska Valley, Alaska. Under the new order, it is believed that more people will have a better opportunity to prospect the area for coal development than previously.

Climax Diversifies

Merck & Co., Inc., and the Climax Molybdenum Co. have submitted a joint bid for a Government-owned chemical plant for the manufacture of butadiene, the largest raw material component of GR-S, the major synthetic rubber.

This plant is one of eight petroleum butadiene plants constructed during the war when the United States was cut off from the major source of natural rubber in the Far East. They are now to be sold to private industry.

Butadiene is an important and highly reactive organic chemical compound which may have possibilities in fields beyond its major use in synthetic rubber.

This bid is merely the preliminary step in a procedure outlined by Congress, which will not be completed until March 1955. If a plant is acquired, the two companies will operate it as a joint venture on an equal basis.

For Climax this bid is another step in the diversification program initiated by the present management. In addition to molybdenum, Climax is now a producer of uranium, vanadium and tungsten. It also has some investments in oil properties.

Renovation Improves Recovery

Completion of the renovation program at the Arthur and Magna mills by Utah Copper Division of the Kennecott Copper Corp. has resulted in an 11 per cent increase in recovery of molybdenum, it was stated in the firm's annual report. Silver recoveries were increased five percent; copper recoveries, one percent; and gold recoveries, one percent as compared with levels of operations before the changes were made.

The company also reports that work at its laboratories located on the campus of the University of Utah has enabled it to place on a pilot scale experimental basis the following:

(1) Methods to hike recovery of copper from ores mined in Kennecott's Chino and Ray divisions in New Mexico and Arizona.

(2) Work on recovery of greater gold values from the ores mined at Bingham by Utah Copper division.

(3) Development of methods to leach the tailings accumulated over the years at the Chino, New Mexico mill.

Tungsten Mill Bought

The government has disclosed that the Wah Chang Corp. has bought the mill of the former Boulder Tungsten Mines, Inc., west of Boulder, Colo.

The government took over the property by foreclosure in March after the former operators were unable to meet a contract for delivery of tungsten. Federal officials believe the purchase of the property by Wah Chang means a big stimulus for Colorado's tungsten industry.

AEC Posts Radioactivity Maps

The U. S. Atomic Energy Commission has announced a new location for posting maps showing radioactive anomalies. The temporary posting place is at Globe, Ariz. An index map showing locations of anomalous areas in the general vicinity will be posted there on the 15th of each month during the period in which airborne reconnaissance surveys are being conducted in that area.

Dredge Installed

A large portable dredge and washing machine is being installed by Twin Rivers, Inc., at the Golden Rule placer grounds in the Warren mining district of Idaho County, Idaho. The new plant, which weighs 135 tons, is capable of handling up to 250 yd of gravel per hr.

Golden Rule placer has been in almost continuous production since its discovery in 1862.

—BOOK REVIEW—

NRB PUBLIC SPEAKING MANUAL, *Compiled by Editorial Staff, National Research Bureau, Inc. Loose leaf, 8½ by 11—237 pages. Price $17.95.*

NOW THAT we have had a chance to test the methods of preparing a public address advocated by the editorial staff of the National Research Bureau, Inc., in this very complete manual, we are in a position to say whether it works. It does.

As far as we can tell, the approach taken by the manual toward effective public speaking is unique, especially the "check list" method of step by step preparation for delivering a talk.

Part I deals with the mechanics of making a speech and deals with such topics as: how to prepare for your speech; how to write your speech; how to learn your speech and how to deliver your speech. Part II deals with the problems you will face; Part III, with a reference workbook and gives tips on source material and how to start a scrapbook, which is an invaluable source of material for a living address. All in all this loose leaf manual would be a great help to experienced speakers and, to tyros like this reviewer, it has been a blessing.

NONFERROUS METALS INDUSTRY, *1932-1954. By Vernon H. Jensen, Cornell University, Ithaca, N. Y. 344 pp. $4.00.*

THIS volume, No. 5 in a series of Cornell's studies in industrial and labor relations, is a historical study of the development of unionism in the nonferrous metals industry between 1932 and 1954. It is, in particular, a history of the leadership of the International Union of Mine, Mill and Smelter Workers. Background material has been drawn from two major sources—union publications and personal interviews with participants and close observers. Rank-and-file opinions have been solicited as well as the opinions of union and industry leaders.

Revealing how left-wingers and Communists work within a union to gain control, this story also attempts to tell objectively of the beginning, growth, development, leadership, problems and vicissitudes of the union and of the persons who are active in the movement which gave rise to it, sustained it, and led it or allowed it to go along paths not originally conceived or planned by the rank and file.

THE BONANZA TRAIL, *by Muriel Sibell Wolle. Published by Indiana University Press. Seven by ten inches—510 pages, illustrated. Price $8.50.*

MRS. WOLLE, a teacher of art for 26 years and for 19 years head of the University of Colorado's Department of Fine Arts, is as skillful at her typewriter as she is at her easel. In this book, which is complete with a glossary, a selected bibliography and an alphabetical index, she describes many of the ghost towns and near ghost towns in 12 Western States.

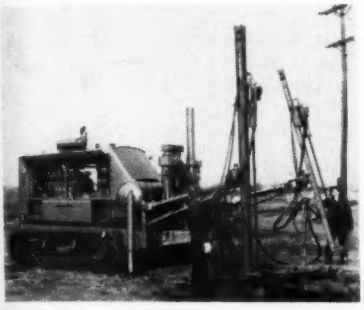
Not only does she paint word pictures of these old mining camps as they are today, but she brings their palmy days back to life in a book that can be read piecemeal but is always fascinating. The illustrations, executed by the author, are an integral part of the text and convey the feeling of the town on the day Mrs. Wolle saw it.

We second the paragraph on the dust cover which says, "A guide book for the adventurous . . . attractive alike to travelers, American history enthusiasts, and collectors of Americana. Nor will its pages soon be forgotten by the general reader." In addition we feel that every mining man who has thrilled to the "old days" will get a personal and particular satisfaction from reading this fine collection of historical vignettes.

Manufacturers Forum

Self-Propelled Drill

Ingersoll-Rand has introduced a new self-contained and self-propelled twin-drill rig designed to cut cost and speed operations on heavy-duty wagon drill type jobs. The completely integrated unit includes two hydraulic booms, two 10-ft wagon drill towers, two heavy-duty rock drills, a crawler assembly and a 600-ft rotary compressor.



The Drillmaster unit weighs 28,500 lb, utilizes two X71-WD drills with an eight-ft steel change. It will drill holes up to 18 ft, 6 in. between centers. Moving speed is two mph on the level and it will negotiate a 15 percent grade.

For additional information, write Ingersoll-Rand Co., 11 Broadway, New York 4.

Announce Strong Belt

According to the Goodyear Tire & Rubber Co. the world's strongest conveyor belt will be built by the company for installation at a mining operation in Northern Minnesota. Goodyear's belting department reports that the belt is designed to operate at 120,000 lbs of working tension.

The belt will haul low grade iron ore 1000 ft on a line while lifting it 280 ft. Maximum tonnage on the 60-in. wide, steel cable belt will be 3360 tph or almost one ton a second.

Driving power will be supplied by three 400-hp motors with force applied to the return portion of the belt at its approximate center. Belt speed will be 395 fpm.

Construction of the belt will consume 48,000 lbs of specially compounded rubber, 7000 sq yd of belt fabric for plies, and 85 miles of high tensile strength steel cable.

Portable Ventilator

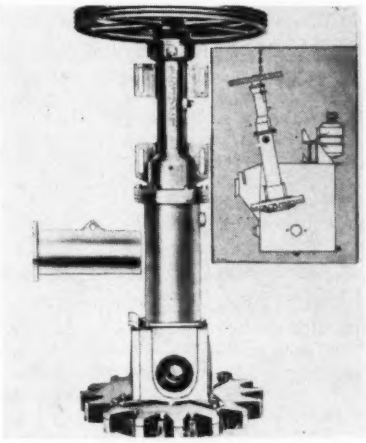
A new Portable Ventilator has been announced by the manufacturer, Mine Safety Appliances Co., Pittsburgh, Pa.

Used as a blower or as an exhauster, the two-way ventilating system is a compact, easily portable ventilator. It may be used either with or without the accompanying collapsible air duct.

With its duct, the MSA Portable Ventilator is described as ideal for ventilating confined areas which cannot be reached satisfactorily by conventional types of stationary ventilating equipment.

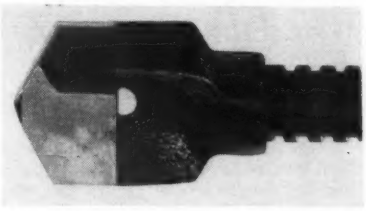
New Flotation Mechanism

A new Suspended Unit Shaft Assembly designed to reduce "down time" for maintenance in Denver, "Sub-A" flotation cells, is announced by Denver Equipment Co. Assembled as one unit, the shaft assembly is suspended in the tank by four bolts. Removal of the four bolts allows the mechanism to be lifted from the cell. Parts for the new shaft assembly are interchangeable with parts for older models. A removable feed pipe enables the assembly to be adapted for either standard cell-to-cell or free-flow of pulp operation. For more information, write to Denver Equipment Co., P. O. Box 5268, Denver 17.



Announce Rotary Drill Bit

The Vascoloy-Ramet Corp. of Waukegan, Ill., has announced the development of a new Rotary Spade Head Bit for use in rotary drilling. Available in 1⅛-in. Hexagon or Acme Threaded shank, it is specially designed for hard ore drilling in materials such as argilite, impure quartzite, hard hematite, blue slate and hematite, dike, ore and silica. The bit is tipped with carbide. Further details on the bit may be obtained from the company.



Keep Controls Dry

Dri-Pak, a means of reducing moisture content and the corrosive effect of dampness in electrical compartments in and around the mines has been introduced by National Mine Service Co. Particularly effective for use in electrical control panels, the unit also can be conveniently fitted in idle electric motors and in other enclosed and confined places.

A Dri-Pak unit is composed of a special, small diameter, tubular type, flexible synthetic bag which holds the dehydrating material, plus a serviceable, screw-top container. The container, covered inside and out with heavy aluminum foil, assures that moisture is kept away from the Dri-Pak until it is placed in service, and also protects the bag while it is being returned for re-activating.

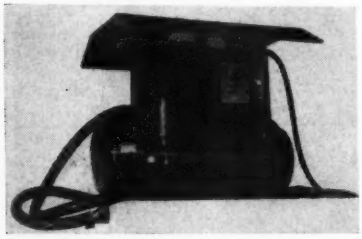
When saturated, the bag holds about 4 oz of water, which can be expelled, and the contents reactivated by placing the unit in an oven with a temperature of 325° to 350° F for three hours. It can be re-activated any number of times. The only limit on the material's service life is the care the containing bag receives.

Additional details on the Dri-Pak may be obtained from National Mine Service Co., Beckley, W. Va.

Battery Chargers

A complete new line of Hobart Automatic Battery Chargers for Mine Locomotive Batteries is being announced by Motor Generator Corp., Troy, Ohio.

Illustrated is the single circuit auto-



matic charger with a drip proof cover. A four-page descriptive data sheet gives complete specifications on standard models of one through four circuits and up to 50-kw capacity.

For complete information, write Motor Generator Corp., Dept. 114, Troy, Ohio.

Four New Mack Tractors

Four new tractors of high power-to-weight ratio are announced by Mack Trucks to round out its modern "B" Model line.

Designated as Models B-70T, B-70ST, B-71T and B-71ST, the tractors are four-and six-wheelers, gasoline and diesel-powered. Four-wheel models are rated from 50,000 GCW to 63,000 GCW, depending upon trailer axle combinations, while the six-wheel versions carry a 76,800-GCW rating.

Portable Rock Drill

A new principle in the design of rock drilling and concrete breaking hammers is embodied in equipment introduced to the American market for the first time by Pitnam Industrial Products Co., 608 Fifth Avenue, New York 20. Although new in this area,

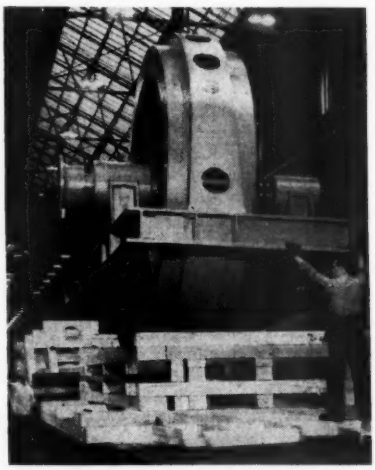
the "Pinazza" drills and concrete breaking hammers have been widely used in Europe, Africa and South America for several years, having been first introduced in 1944.

"Pinazza" hammers are driven by a small, portable gasoline engine or electric motor through one or more flexible shafts. Because the power unit and hammer are separate, the hammer can be operated in any position.

The rock drilling hammers can be used for either wet or dry drilling. In the case of dry drilling, a small rotary compressor provides the air necessary to clear the hole.

Motors to Drive Giant Ball Mills

The last of six, high-torque, 1500-hp, 150-rpm synchronous ball-mill motors is shown being loaded on a flat car at General Electric's Large Motor and Generator Department in Schenectady, N. Y., for shipment to the White Pine Copper Co., Mich. The motors will drive what are reported to be the world's largest ball mills, each 12 ft long, 13 ft in diam, and weighing about 300 tons. To turn these mammoth grinders the inherent high torque characteristics normal for ball-mill drives had to be incorporated into the



largest motors ever used for this type of application. By using such large mills and motors, White Pine, engaged in expansion of low-grade ore processing facilities, was able to reduce the installed cost per horsepower of grinding capacity. The mills are expected to grind 10,500 tons of low-grade (chalcocite) copper ore daily.

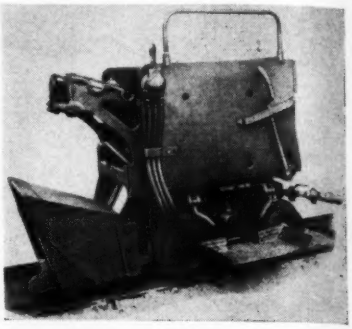
Mine Car Loader

A new underground loader has been designed to speed up the loading of mine cars and to increase safety for the operator. The Gardner-Denver Model GD10 is equipped with a 4¾-cu ft dipper.

Safety features of the GD10 include a clean exterior design, low center of gravity, and high-flange, wide-tread wheels that prevent rail jumping. In addition, both the traction motor and dipper motor controls—as well as the step plate—can be easily and quickly moved to either side of the machine so that the operator is always in the safest position.

The one-piece dipper has a rounded bottom that is said to be self-cleaning when mucking sticky ore. The lip is shaped to facilitate cleaning between the rails and at the face.

Daily maintenance routine for the



GD10 has been reduced to only two lubrication points, and both of these take the same kind of oil. Power is supplied by two Gardner-Denver high-torque, five-cylinder, radial air motors.

For further information, write Gardner-Denver Co., Quincy, Ill.

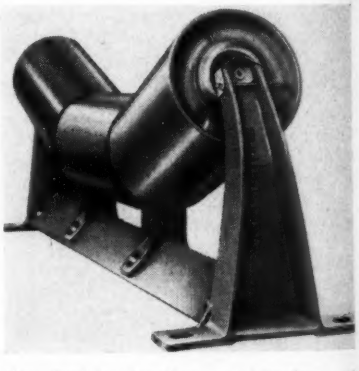
Gear and Wheel Pullers

Armstrong-Bray & Co., Chicago, announce a new portable single ram hydraulic power unit for pulling or pushing gears, wheels, bearings or parts; for pulling or pushing cylinder sleeves, etc. This new "Hydragrip" unit consists of a small, hand-operated hydraulic pump, connecting hose and single ram hydraulic actuating unit.

New Belt Idlers

The Jeffrey Manufacturing Co., Columbus, Ohio, has announced the introduction of its latest MD and HD Series Belt Idlers with the new "Duoflex" Seal, according to J. A. Jeffrey, vice-president, Conveyor Division.

Dual flexible contact seals perform



the double function of keeping out dirt and retaining the grease. As an added feature, the entire design of the idler permits re-greasing from either end when and if desirable through the shaft, the grease reservoir and the new "Neoprene" shaft connectors.

Complete Bit Line

Addition of 12 new cemented carbide-tipped mining tools to its line now enables Carboloy Department of General Electric Co., to offer users a complete "off-the-shelf" selection of standard tools for both continuous and universal mining equipment. The new tools include roof bolting and auger drill bits, heavy duty roof bolting drills, modified V-prong drills and a ripper head bit.

According to Carboloy, the V-prong auger drills, designated ADN-1¾, 1⅞ and 2 are designed to provide improved, free-cutting rapid penetration in abrasive formations.

The ripper head bit, the CC-4, was designed for the drum that replaces the center chains in the Joy continuous miner.

Auger drill bits AD-1½, 1⅝ and 3 are designed for blast hole drilling. The smaller ones are particularly designed for the potash mining industry.

For heavier roof bolt drilling, especially in sandstone or limestone roofs, a new, harder grade of cemented carbide tip has been added to standard heavy duty roof bolting drills PTH 1 5/16, 1⅜ and 1½.

The new tools are now stocked by all Carboloy distributors in all major mining areas.

Hydraulic Sizer

The Dorr Co., Barry Place, Stamford, Conn., announces the availability of the Dorrco Jet Sizer, a new hindered settling hydraulic classifier, for the sizing and grading of solids eight mesh and finer.

The manufacturer claims the major advantages of the Dorrco Jet Sizer are the elimination of the expensive constriction plate construction and the unusual flexibility with respect to pocket arrangement.

The Jet Sizer is applicable to all problems involving the grading of eight mesh and finer materials of varying size distribution. The increase in the maximum number of pockets permits a single unit to handle flows previously requiring two or more smaller machines. The tonnage a given unit can process is dependent upon the type of material as well as particle size distribution and specific gravity.

ANNOUNCEMENTS

The Jeffrey Manufacturing Co. recently announced the election of **J. E. M. Wilson** as vice-president in charge of sales following the board of directors annual meeting the latter part of May. He had been vice - president and manager of the Mining Division. As new vice - president of sales, Wilson immediately announced the appointment of **A. R. Anderson** as general manager of sales for the Mining Division; **Lincoln Kilbourne** as general manager of sales for the Conveyor Division and **J. B. McNaughton** general manager of sales for the Special Products Division.

J. E. M. Wilson

E. J. Longyear Co., Minneapolis, announces the appointment of **Allyn E. Harper** to the position of chief of the company's Mechanical Engineering Division. Harper was formerly chief engineer of Oliver Iron and Steel Corp., Pittsburgh.

The appointment of **W. H. Pender** as manager, Belting Sales, **Quaker Rubber Corp.**, Division of H. K. Porter Co., Inc., Philadelphia, was announced by G. A. Dauphinais, vice-president and general manager.

Emory M. Heuston, associated with the advertising department of **Bucyrus-Erie Co.** for 25 years, during the past nine years as publicity manager, has joined the **Richard T. Brandt, Inc.**, advertising agency of Cleveland.

Martin B. Jaeger succeeds Heuston as publicity manager at Bucyrus-Erie. Until his recent promotion, Jaeger was assistant publicity manager.

Gifford V. Leece has been elected president of **Gardner - Denver Co.**, Quincy, Ill., and **Benjamin C. Essig** has been elected executive vice-president.

Edward Lebo, public relations director of **Hewit-Robins Incorporated** has been given the additional responsibility of advertising manager.

George Acock has resigned from the Rome Cable Corp. to join **The Kaiser Aluminum & Chemical Corp.** in Newark, Ohio.

C. F. McGunigle has been appointed vice-president of the **Syntron Baltimore Sales Co.**

Otto von Perbandt has joined **Wilmot Engineering Co.**, as a contracting engineer for the company's coal preparation equipment. Von Perbandt has been engaged in the engineering of preparation equipment for the American coal industry for over 25 years. He comes to Wilmot from the Nelson L. Davis Co. His previous associations were Allen & Garcia Co., Roberts & Schaefer Co., and Link-Belt Co.

CATALOGS AND BULLETINS

BRATTICE CLOTH. *American Brattice Cloth Corp., Warsaw 2, Ind.* Catalog 54 gives facts and figures concerning ABC's Mine-Vent flexible ventilation tubing and describes equipment for suspending and coupling the tubing. Other sections describe ABC Brattice Cloth, Powder Bags and Inflatable Brattice.

HYDROSEAL PUMPS. *The Allen-Sherman-Hoff Pump Co., 259 E. Lancaster Ave., Wynnewood, Pa.* Catalog No. 953 contains information to assist the mine operator in selecting pumps to handle abrasive materials.

MINING TOOLS. *Carboloy Department of General Electric Co., Detroit 32, Mich.* Catalog CM-120 includes the full line of standard stocked cemented carbide mining tools carried by Carboloy. Complete information including design specification is given on cutter bits, finger bits, auger drills and roof bolting drills.

DENVER-WILFLEY CONCENTRATING TABLES. *Denver Equipment Co., P. O. Box 5268, Denver 17, Colo.* Bulletin No. T1-B3 explains how tables are used to treat materials subject to gravity concentration. Data describing several models are included as well as their application in the flowsheet. Operation, design and application of visual samplers, tilting concentrators, self-rotating pulp distributors, hydraulic classifiers, selective mineral jigs, spiral concentrators, vertical centrifugal sand pumps, rubber lined sand pumps and automatic samplers, is also described.

50-T BLAST HOLE DRILL. *Bucyrus-Erie Co., South Milwaukee, Wis.* A 24-page bulletin describing Bucyrus-Erie's 50-T Blast Hole Drill, a large-hole churn-type drill. Other features described are the new type crawler mounting, optional equipment and selection of drilling tools. Ask for Bulletin 50-T-2.

MINERAL DRESSING NOTES. *American Cyanamid Co., 30 Rockefeller Plaza, New York 20, N. Y.* Bulletin No. 20 describes properties and applications of various Cyanamid chemicals used in ore beneficiation plants and processes. It also contains sections describing flotation practice for various metallic ores and a summary of flotation methods used for treatment of various non-metallic minerals. Tables summarizing usage of various flotation chemicals and a selected flotation bibliography are included.

MOTOR SCRAPERS. *Allis-Chalmers, Tractor Div., Milwaukee 1, Wis.* Allis-Chalmers has recently made available two bulletins, TS-200 and TS-300, describing the operation of their 13 and 18-cu yd capacity motor scrapers.

HEAT DRYING OF COAL. *Link-Belt Co., 307 N. Michigan Ave., Chicago 1, Ill.* A paper describing research in the use of Multi-Louvre dryers for drying and pelletizing fine coal. A plant designed to reclaim a 35-acre bituminous coal slurry pile is pictured and described. Ask for Book No. 2507.

Index to Advertisers

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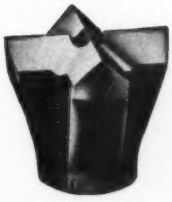

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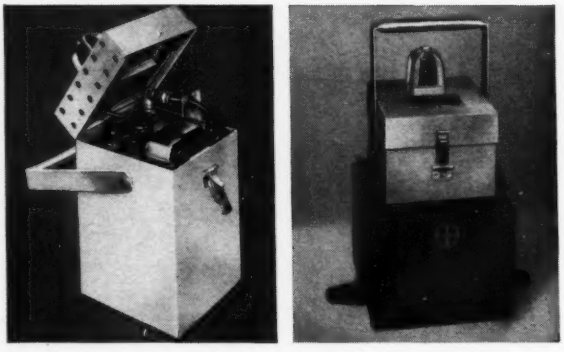

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